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In This Issue—*Opportunities in the Tire Business*

MOTOR AGE

Volume XXXVIII
Number 5

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JULY 29, 1920

Thirty-five Cents a Copy
Five Dollars a Year

UNION CLUB

Note How Hudson Dealers Grow With Hudson

97% of Our Product Is Sold Through Men Whose Connection Exceeds 7 Years

Hudson's 10 years of motor car building have been a record of constantly growing success.

No period of depression has ever even temporarily checked its forward stride. It has never had a year that did not show an advance over the preceding year.

And Hudson dealers who shared in the enterprise and energy that built this great business, have also partaken in generous measure of the prosperity it has brought.

Moreover their prosperity has permanence. They have not been dispossessed of franchises that their efforts have helped to make so valuable.

Today more than 97% of Hudson's product is handled through men whose connection exceeds 7 years.

In undertaking a franchise is it not wise to consider these things?

During boom times, in days of indiscriminate buying, perhaps dealers are sometimes likely to forget the warning in the long list of automobile failures that have swept away the business of its dealers, requiring them to start afresh, and under handicap.

But the value of Hudson security has time and time again become a vivid reality, as it stood without a tremor through depressions that have pinched out less firmly founded companies.

In considering a franchise we expect you will by all means be alive to the immediate profits that a Hudson franchise brings.

But do not overlook the vitally important factors of security and permanence which it also offers and which must be the basis of a dealer's lasting success.

Hudson Motor Car Company — **Detroit, Michigan**

(H-8)

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Dealers: UTILITY Universal Rim Wrenches are for you to use as well as sell. Both ways, **they pay.**

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Jobbers: Get in touch with us.

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MOTOR AGE

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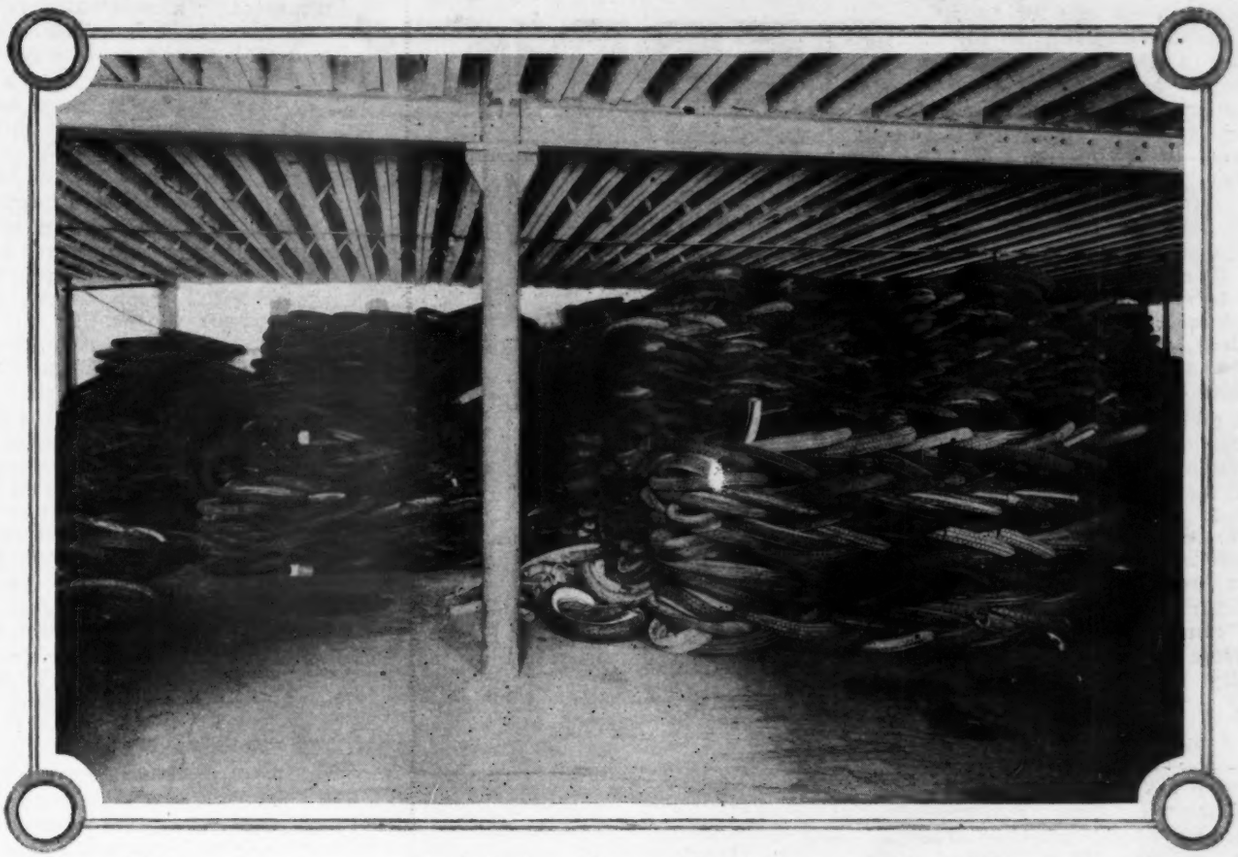
MOTOR AGE



This is a corner in a scrap tire dealer's warehouse. The tires are sorted into different piles and those in the foreground at the right are the ones which have been mutilated at the factory in order to determine the efficiency of the cure

NEW OPPORTUNITIES IN TIRE REPAIRING

Time for the automotive dealer to give this important branch of service serious thought. Like the shoe store which has the best shoe repair shop finds the least difficulty in building up business and increasing profits, so the tire dealer or automobile dealer who takes this work on with his other service and who gives the best attention to showing owners how to get the most out of their tires and also conducts the best tire repair department, is going to get the cream of the business.

UP TO the outbreak of the war and the increasing prices for shoes it had come more and more customary on the part of many people to wear their shoes until they began to show signs of wear and then to give them away or throw them away. Little attention was given to the care of shoes and a great many people never bothered to have them repaired. Increasing prices, however, changed all this. People began to take better care of their shoes, wear them longer and as soon as they began to show sign of wear take them to the repair man. This resulted in greatly increasing the shoe repair business. Shoe repairmen were swamped with business and every shoe dealer found his shoe repair business greatly increasing. In fact, many a dealer who had never before given much attention to shoe repairing, found it necessary to establish a repair department for doing high-class work.

The same thing promises to work out to a considerable degree in the case of automobile tires. When the rubber supply problem was solved by means of great rubber plantations, the prices of tires tended to decrease. As prices got lower, people came to be more careless with their tires. There were a number of people who, when their tires began to show signs of wear, did not bother to have them repaired but threw them away, sold them or otherwise disposed of them and bought new tires. These people argued that the time they lost in changing tires on the road was worth more than the cost of new tires, even though they could get little or nothing for their old ones. This was especially the case with light cars used for business or professional purposes where the cost of a new tire was low.

With the coming of the war, however, a new difficulty was encountered in the tire situation. The rubber problem was solved but the war complicated the cotton problem. Much of the cotton used in tire fabrics and cords is imported

from Egypt. Difficulties have been placed in the way of getting this cotton. The American Sea Island Cotton crop has steadily been reduced due to the ravages of the boll weevil and has dropped from 100,000 bales or over per year to some 10,000 bales. The quantity of other cotton raised in this country which is suitable for tire manufacture is also considerably limited.

This all means that for some time to come the tendency will be for tires to increase in price rather than to decrease. Just at the present time, the transportation situation is making matters worse.

In short, the tire situation seems to be following in the footsteps of the shoe situation. Just as people began to be more careful with their footwear as prices began to increase and to give more attention to getting it repaired there is every reason that people are going to give more and more attention to their automobile tires, are going to give them better care and have them repaired to a greater extent than they have ever done before.

This all means that the tire repairman is going to find his business increasing at a greater and greater rate. As a matter of fact, people may be forced to resort to repaired tires whether they want to or not, for if the cotton situation gets much worse there will not be enough tires to go around, except at a very high price. The only way that prices can be kept down is by giving tires more care and having them more carefully repaired.

Conscientious Dealer Profits

There is also every indication that just as the shoe store that has the best shoe repairshop is finding the least difficulty in building up business and increasing profits, so the tire dealer who gives the most attention to showing people how to get the most out of their tires and also conducts the best tire repair department is going to sell the most tires and make the most profit on his tire business for the reason that the repair department will help both sales and profits.

In fact, it would seem that it would be the better part of wisdom for all concerns selling tires to give more attention to the repair end than they have in the past. There is every indication that there will soon be plenty of repair business to more than go around. In fact, if conditions get any worse at the cotton mills than they are at the present time, there is danger that there will not be enough tire repair shops to meet the demand for repairs.

It will take considerable time for the cotton mills to catch up with demand. Not only are they finding it hard to get cotton but also to get machinery. Cotton machinery manufacturers are now taking orders for delivery in 1922 and 1923. Concerns that ordered machinery a year or more ago will have to wait for another six months before they can get deliveries.

It is easy to see what this all means. It means that not only is there every indication that tires will remain up in prices but they will probably increase in price and the better grade of tires will not be any too easy to get. Of course, this condition may result in the placing upon the market of cheap tires made of short fibre cotton, in fact, from cotton with such a short fibre that the tires will show but a very small mileage. A little experience with these tires will soon convince motorists that it is more profitable to buy the better grade tires and have them repaired.

The tire dealer who establishes a tire department now or the man who starts a tire repair business should experience no difficulty in keeping busy in the tire repair work. All that is necessary is to do good work and to give tire users good advice in regard to tires. It is highly important that all tire users have impressed upon them the importance of having the repair work done in time, for it does not require many miles of driving after the tire has reached the repair stage to damage it to such an extent that satisfactory repairs cannot be made.

Retreading will probably become far more popular in the future than it has been in the past and provided motorists will keep their tires properly inflated, and will have the work done before the fabric or cord is damaged, re-treading will prove a profitable investment in these days of the high cost of tires.

The cost of establishing a tire repair department is not prohibitive for any man in the tire or automobile repair business. An investment of a few hundred dollars is sufficient to make a start or if so desired an investment of several thousand dollars can be made to equip the plant for all sorts of work.

The two essentials of success in this work are first the careful inspection of all tires that are brought in for repairs. If a tire has been abused to such an extent that the fabric or cord is very badly damaged it will be poor business to attempt to repair it, for that tire will never give satisfactory service. It will be far more profitable in the end to condemn it, and if the owner insists upon having repairs made, allow some competitor to make them. Since the tire will never give satisfactory results, it is far better in the end to refuse to do work which will prove unsatisfactory and cause lack of confidence on the part of the tire owner. In the end he will come back and prove to be a steady customer if no work is done on tires that have already been ruined. Also, he will learn how to give his tires better care and as a result will be able to get more mileage from his tires.

Finished Job Must Look Well

The second essential of success is the doing of careful work. No matter how good the equipment installed or the material used, if the work is not done with the greatest care, the results will not be satisfactory. Special attention must be paid to preparing the tire for repairs. All the weak spots must be found and reinforced. All fabric and rubber must be carefully and smoothly applied. No air bubbles or air pockets must be left to cause trouble when heat is applied to the tire. Every particle of sand and dirt must be removed. It is better to do the work right than to try to do it cheaper and in the attempt only succeed in wasting material and causing a customer to be dissatisfied.

When a tire is properly repaired, the repaired spot should be the last place where any trouble will develop. Not only must the work be well done, but attention must be given to the appearance of the finished tire. In so far as it is possible to do so, the work should be done in such a manner that the repair is not noticeable. Work of this sort means more work and better satisfied customers, and now is the time to begin to do it. For a number of years at least we may expect that the demand for high class tire repairs will increase. Tires will wear out and accidents will happen and both of these call for repairs. The opportunity is there. All that is necessary is to take advantage of it.

TWO ESSENTIALS OF THE TIRE REPAIR BUSINESS

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TOMORROW'S MECHANICS

What a School in New Orleans is Doing to Develop Recruits for the Automotive Dealer's Repair Business

Electrical department, for students in the automobile mechanics' course at Loyola University, New Orleans, La.

THE school of automobile mechanics of Loyola University, New Orleans, has just signalized its first year as an independent branch of the university by rebuilding a broken-down passenger car, bought for $75, into a truck, for which $500 was offered by a local merchant, and promptly refused by the school.

When the United States went into the war, a mechanical training department at Loyola University was established, and such excellent results were accomplished in the way of turning out automobile mechanics that when this government school was discontinued, the officials of Loyola University determined to continue the automobile mechanical branch as a regular department of the university. And manufacturing a good automobile mechanic is much more difficult than building a good automobile, according to N. L. Bird, who had charge of the school. "The main thing," he adds, "is to teach them to test for trouble, instead of tampering with trouble and thereby causing more trouble."

The new student is first put into personal contact with the engine as a whole and in part, and when he has learned as much as possible of the various kinds of engines, he is taught to know, instead of to guess, when anything goes wrong. From there he goes to the electrical department, where he is taught the various starting, lighting and ignition systems and to disassemble and assemble all of them. The students here go through the "trouble tests," so as to become real "trouble shooters" before they graduate. Thereafter they go into the repair department, where they get actual experience in putting disabled cars into condition. The recent rebuilding of the Rambler passenger car into a truck, is an example of this work.

Engine department of the automobile mechanics' school at Loyola University, New Orleans, La.

Some fifty of the graduates of this automobile mechanical school are at work in the garages and repair shops of the city, and all of them, according to Mr. Bird, have been successful enough to hold their jobs, wherever they have been placed. The school will be continued as a perment branch of Loyola University.

Truck made by student mechanics of Loyola University, from a broken down touring car, which was bought for $75. An offer of $500 failed to buy the truck from its builders

The building of the Automobile Gear and Parts Co., Atlanta, Ga., devoted to cutting gears for service replacements

A Modern Plant Devoted to Gears for Service Replacements

How the Automotive Gear Works, Atlanta, Ga., is Doing a Splendid Service for the Industry in Cutting Gears for Practically Every Make of Car

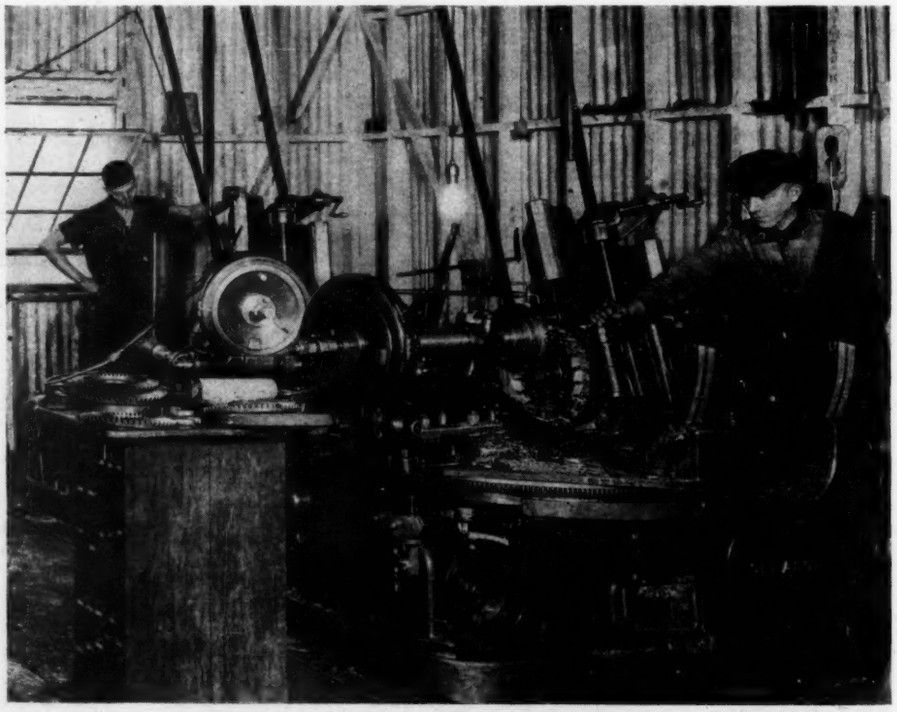
MANY of the present-day service jobs are dependent for their completion on the availability of parts. It is especially desirable that the automotive dealer keep in stock a good supply of differential, transmission, timing gears, etc., because the modern motor car, truck or tractor is dependent to a large extent upon gears of some form or other.

Parts, especially nowadays, are not coming through to the automotive dealer or service station in as large a quantity or as fast as desirable and the consequence is that dealers have to look to outside sources for their supply of parts. Many concerns now are specializing in the manufacture of some particular part of cars or trucks for service replacement and to that end the Automotive Gear Works, Atlanta, Ga., is doing much good, being in position to furnish gears of all descriptions and for practically every car. It generally is conceded that this concern is the only one of its kind, that is, a gear-cutting concern, serving the replacement business exclusively. In addition to the gears, the company also makes axle shafts.

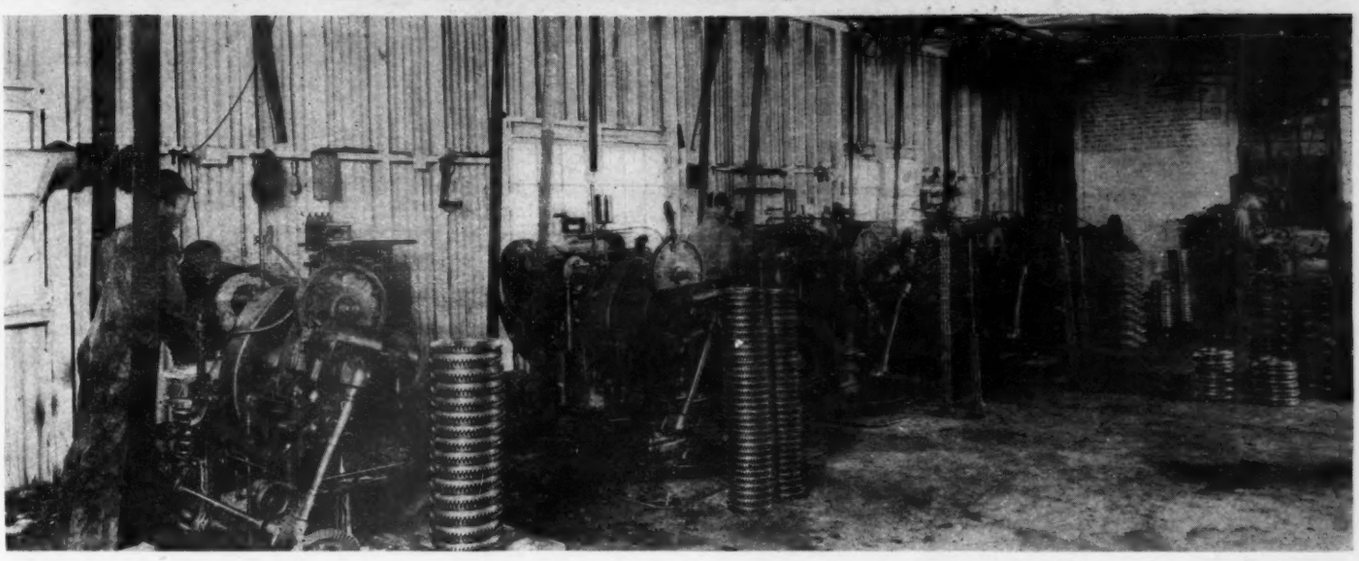
Supply Gears and Axle Shafts

The history and development of this business reads more like fiction than fact. The business was started in 1912 by Edward P. Horton a pioneer of the automotive field. Like many others of the automobile men, Mr. Horton is a graduate of the bicycle business and his initial experience with the automobile was in 1902 when he engaged in the sale of the old Locomobile steamer. In 1905 he became identified with the Maxwell-Briscoe Motor Co., Tarrytown, N. Y., and remained with that company and its successor the United States Motors Co. until 1912, being at different times in charge of their branches at Syracuse and Albany, N. Y., and Atlanta, Ga.

At the time Mr. Horton started the business of supplying replacement or service parts, his line was confined to practically all parts for Maxwell-Briscoe cars, but he later included many more of the so-called orphan cars. However, it was not long before he realized that it would be an almost impossible task to carry in stock all parts for so many different makes of cars and render dealers and repair men prompt and efficient service for their replacement parts. It was then determined to specialize in one branch of the repair parts business—that of supplying transmission and rear axle gears and shafts only. The original plant equipment consisted of a few engine lathes and a single bevel gear generator. To-day, the equipment includes a battery of Gleason generators and roughing machines of both the straight tooth and spiral types with all the modern automatic machines complementary thereto. The transmission gears



A close-up view of one of the gear cutting machines in operation



Two views taken in the Automotive Gear Works, showing the large stock and the battery of gear shapers

are generated on the up-to-date Fellows gear shapers. All gears are heat treated and hardened with equipment designed for this purpose and by men who have made this work a study. Only nickel steel is employed in the manufacture of the transmission gears, rear axle drive-pinions, spiral-drive gears and a large percentage of the straight-tooth drive gears.

In January of the present year the company completed an addition to its plant which a little more than doubled the factory floor space, but at the present rate of growth, this additional floor space will be entirely filled with new machines before the end of the year. At the present time the Automotive Gear Works are in a similar position to that of most other gear cutting plants regarding production. The output is being consumed almost faster than it is being produced, but by the addition of several more Gleason spiral generators and by operating their plant twenty-three hours per day the production is being gradually increased.

The product of the company is sold mostly to the automobile dealers, repair men, garages and jobbers, although numbered among its customers are several of the representative motor car manufacturers whom they supply with gears and shafts for service parts. Practically all of the standard makes of cars and trucks—Ford and Dodge Brothers excepted—are included in the list for which this company supply transmission and rear axle gears and shafts.

In order to more adequately distribute its product, the following list of exclusive distributors have been appointed:

Auto Gear Co., Inc., New York
Auto Gear Co. of Chicago.
Auto Gear Co. of Los Angeles.
Auto Gear Co. of Boston.

The Automotive Gear Works also contemplate the establishment of additional exclusive distributors in several other of the country's largest cities as soon as their production will warrant it.

BUFFALO SHOW SEPT. 27 TO OCT. 2

Buffalo, July 28—Buffalo will have an exclusive closed car show this fall. The Buffalo Automobile Dealers association will conduct it in Elmwood Music Hall September 27 to October 2 inclusive. It is planned to surround the closed cars with an atmosphere of refinement and beauty in keeping with their quality.

The following committee has been named to make arrangements for the show: E. H. Baker, Edward C. Bull, John J. Gibson, Albert Hertzog, Jr., George Ostendorf, Charles F. Monroe, E. G. Oliver and C. C. Proctor. Mr. Baker is chairman of the committee, Mr. Gibson secretary and Mr. Oliver, treasurer. Mr. Proctor will be show manager.

TO DISCUSS FUEL AND CREDIT

Seattle, July 26—Gasoline and automobile financing form the big topics of discussion scheduled for the sixth annual convention of the Washington State Automobile Chamber of Commerce, held at Aberdeen, Wash., July 30 and 31.

In response to a telegram sent to the president of one of the big oil companies an official representative was assigned to the convention to bring first-hand news of the gasoline shortage and prospects of improvement. Finance will be discussed by another authoritative speaker from one of the big guaranty companies.

TRAVELING TRACTOR SCHOOLS

Used During the War to Increase Production and Proved So Valuable That They Are Still Continued and Are Eagerly Attended by Farmers

Class of farmers and farm hands learning how to drive and operate a tractor most efficiently. When the field division of the traveling tractor school moves on it has left behind a large number of trained men capable of operating and repairing farm engines intelligently

THE incessant sputter of a dozen gas engines, many sizes, speeds and shapes, in a flaming poppy field caught attention as we drove on a road through Napa County, California, recently. There were wheeled and crawler machines moving this way and that, breezing merrily along and we thought that here was a Spring demonstration of motor farm equipment by the progressive dealers of the valley.

But it's a frost, we thought, for the crowd is slim. Doesn't seem real in these days when almost every farmer either owns a tractor or is planning on buying one next season.

More men were riding tractors than were watching them. In fact there were only three spectators other than the small boys who scrambled along in the furrows joyously pressing the warm, moist soil between their toes. We were curious so we stopped and walked over to where one of the men stood. He was calling out to a young fellow who did not have his plow set deep enough.

"What is this all about?" was asked.

"The tractor drivers' school," he replied mechanically, still watching his student to see that the plows were set right. "The California Tractor School—State Board of Education, California Tractor and Implement association, Napa High School, Napa County Farm Bureau and University of California College of Agriculture, co-operating. We are making farm boys, farm hands, farmers, city boys and some girls into tractor drivers. And, goodness knows, we need them in this motorized age."

"That's interesting," said we, with deep originality. "Why, who, what—?"

"The questions arose in a flock after he had finished that lengthy list of names, but decided that they couldn't be answered at once. What we wanted to know was why they started these schools, who germinated the idea and what it was doing. It was nearly noon so we asked the instructor if he could tell us something about it at lunch time. When the tractors stopped humming and the students dived for their lunch pails we picked out a grassy little knoll in the fence corner and talked as we munched our sandwiches.

"Not much interest here; your crowd is rather small," we suggested.

"This is only a fraction of the class," he replied. "The rest are over at the high school taking shop work. They come out here in relays."

Then he continued in answer to my question.

"The tractor school really is a 'war baby'" he said. "But it has out-lived the war and has developed greatly since then. It is a permanent thing now with all those interested in tractors, in education and in supplying the farmer with trained men co-operating. That is why I gave the long list first—don't want to overlook anybody. It is a case of true co-operation. Every element interested is working toward one end and that end is the production of more food. And, everyone knows America needs more food now."

It is no longer a matter of convincing the farmer of the value of the tractor but one of teaching him how to operate it

Started During War

"When was the start made?" we asked.

"During the war, when it became evident that to supply enough food for the world we would have to motorize agriculture," was his reply. "I don't know who first thought up the stunt but I believe Marshall DeMotte, who is a member of the State Board of Control and a farmer, too, had a great deal to do with it. The details were worked out by Dr. Edwin Snyder, State Superintendent of Vocational Education, in company with a committee of tractor men.

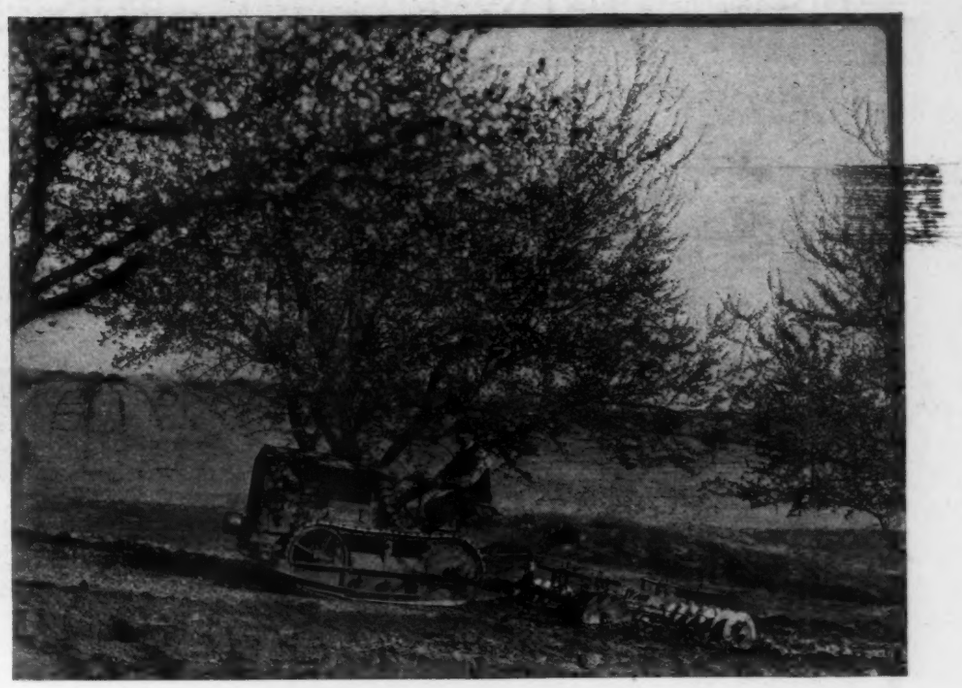
"At that time the plan was this: The state supplied a man to organize the schools. It furnished instructors and a part of the equipment, such as tools. Tractor dealers and manufacturers were called upon to supply the tractors and also some knocked-down engines for shop work. The state's men then went

out and interested the trustees and instructors of rural high schools. These high school officials took charge of organizing local classes, did the advertising, provided a shop and a field and got everything ready for the opening of the school.

"In those days we called it the State Traveling Tractor School, for the instructors and most of the equipment, to the value of $25,000, moved from place to place all over the state. Schools were held in Los Angeles County, 600 miles from here, and at Chico, which was the most northerly point reached. During the year more than 3000 men and some women learned to drive and to care for tractors at these schools. Our Chico class totaled more than 300 persons.

"Some of the equipment traveled by motor truck over the highway and the heavier machines were mounted on flat cars.

"Nobody can tell how much good these schools did during the war, but I'll venture they were responsible directly for the production of hundreds of tons of food. It was simply impossible at that time to get enough men who know how to handle tractors. Tractor operators were exempt from the draft, as you know, but that did not help much. Most of them were young and went into the service as volunteers."



It has been demonstrated that in the orchards of California a tractor can get closer to the trees and do better work than horses

Farmers Learn at Home

I learned later from others interested that during the war the California Agricultural College also was holding tractor courses for farmers at the University Farm School, Davis, and at the Citrus Experiment Station in Riverside County, which is in the southern part of the state. These short courses in tractor engineering attracted hundreds of men and some women, but the chief difficulty was that some students had to travel long distances and remain away from home to take advantage of them. The big thing in favor of the traveling school was that it took the courses to the students. They could stay at home, if farmers, and oversee their work while attending school.

After the war was over, the State Board of Education's emergency fund for the handling of these traveling schools was exhausted, but they had proved so valuable that the California Tractor and Implement association took up the work. George Collins, who was selected as general manager of the association, believed that he could do the members and the farmers more good by reorganizing these schools than in any other way. Accordingly he took up the matter with Professor L. F. Fletcher, head of the Agricultural Engineering Division of the California College of Agriculture, and, with Dr. E. C. Snyder, who originally fathered the plan. The state's funds were available only in a small amount, so Collins, as representative of the tractor organization, went out to organize the schools.

Under the post-war plan, the College of Agriculture furnished the instructors, the state and local school districts provided the field and local shop and the tractor association members furnished equipment. The farm bureaus of various counties became interested and helped organize the classes and country banks, in some cases, helped along by paying incidental local expenses.

Divided Into Two Sections

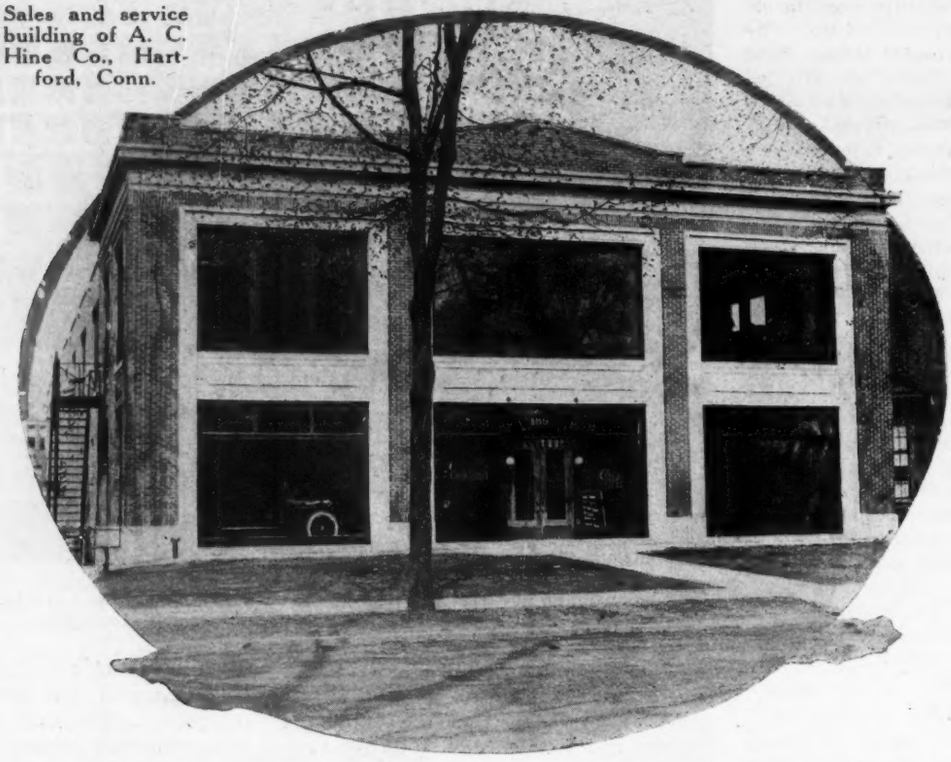
Courses at the various places under the new plan ran from three weeks to a month. The traveling schools are divided into two sections, one of which gives shop work and the other, field work. The shop work crew first moves into a district and the students learn the fundamentals of gas engines, the mysteries of ignition and lubrication and also a little about repair work. Before the shop division is ready to move, the field-training division arrives and the students spend part of the day in the shop and part in

Concluded on page 48.

Left—Tractor school class listening to and watching the instructors tell and demonstrate the repair of a caterpillar track. Right—Tractor school class listening to a lecture in the shop

PROVIDING OWNERS WITH THE BEST POSSIBLE SERVICE FACILITIES

Sales and service building of A. C. Hine Co., Hartford, Conn.



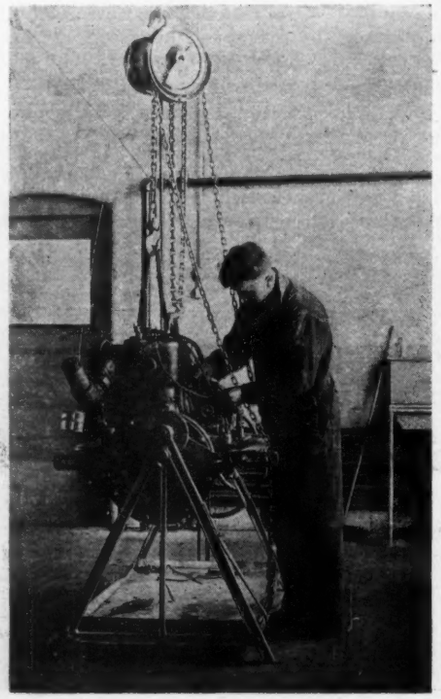
When A. C. Hine Built a New Sales and Service Station He Realized the Importance of Service and Designed and Equipped His New Building for It

IN AN analysis of his business, A. C. Hine, president of the A. C. Hine Co., Hartford, Conn., Cole and Oakland distributor, realized two salient facts. The sales quarters while commodious did not permit of the best possible display of cars largely because the showroom was narrow and deep, necessitating liberal use of artificial light. The other fact realized was that having a salesroom in one part of the city and a service station in another is not the best possible method by any means. And the remedy is a new and up to the minute sales and service building that is a credit to the lines represented, to the owners and to the city. The Hine company's new estabment is well in keeping with the city's desire for civic and architectural betterment. A. C. Hine placed himself in the position of a customer. He bought the car at the salesroom downtown, and then when he needed service he had to chase to another section of the town. And so in erecting this new building, all the angles of the customer have been fully considered.

Residents Oppose Building

Once determined to provide Cole and Oakland owners with the best possible service facilities, there arose the problem of a suitable location. A. C. Hine did some quiet investigating and finally secured a site on Washington street, five minutes drive from the heart of the city. And on that site was a perfectly good residence which had to be razed to make way for the new structure.

When the people of this residential neighborhood learned what was afoot the usual strings were pulled and A. C. Hine found an obstacle in his path. He didn't try to side-step the obstacle, but rather to get it out of his path and he succeeded. To those good folks he showed a set of his plans. "This is what we propose to do," he said, "No cars will come into the building from your street but from another, one block away. What we propose to erect will be a credit to the neighborhood." And when that building was finally finished, A. C. Hine enjoyed the satisfaction of being informed by one of the wealthiest and most influential residents in the neighborhood that he had put up a building that was in every sense a credit to the neighborhood and to the city.



Revolving engine stand used in the A. C. Hine service station

Building Harmonizes With Surroundings

Had the location been other than what it is a different type of building involving less money could have been erected. However, A. C. Hine wanted the best. What he had set his heart on was a substantial structure built for business, yet possessing a touch of architectural beauty, a pleasing simplicity and treatment consistent with the location. With this object in mind he devoted considerable time and study to the preparation of his plans. He made his own drawings. When he had finally mapped the proposition out to his satisfaction, he sent for a good architect and issued his

orders. The architect in turn saw that the builders lived up to specifications. The concern celebrated the arrival of spring in an informal manner in the opening of the new home. The structure is two stories and basement of brick, concrete and steel, built to endure. The front is light brown pressed brick. With an eye to the future, A. C. Hine allowed for the possible addition of another story or two in time to come. Should necessity compel these may be added and be safely carried by the foundations.

The Hine sales and service building provides 36,000 sq. ft. of floor space. The shape of the establishment is rectangular. The building runs through a city block and no cars come through the front entrance, but rather from the rear.

The first floor front is given over to the new car salesroom. This department extends the full width of the building. Large plate glass windows on three sides provide an abundance of natural light. There is room in this section for the display of a dozen or more cars. As one enters the salesroom there is a sense of roominess which is most pleasing. The interior arrangement is not ornate but its very simplicity is dignified and pleasing.

On the south side of the building and directly back of the salesroom are the telephone and information rooms, wholesale department, conference rooms, officers' quarters and the cashier's department. The space taken up by the offices occupies about a quarter of the width of the building allowing for the hallway, also well lighted, that runs the length of the office section.

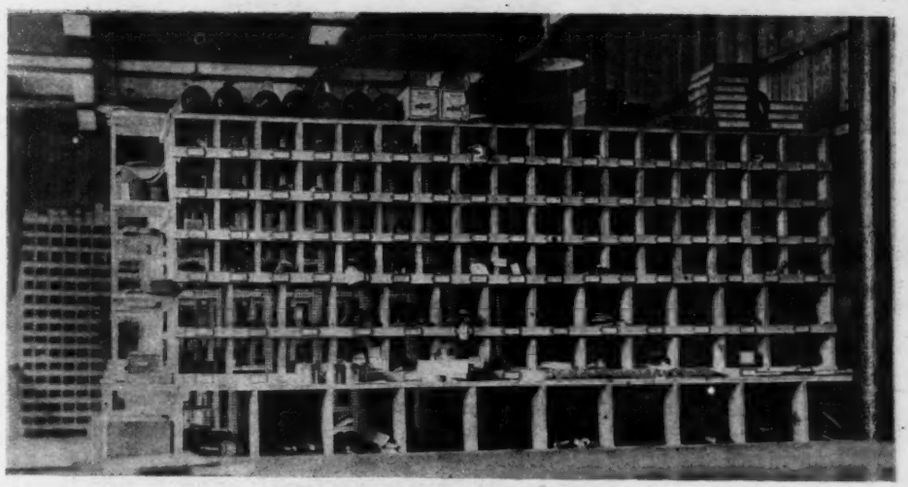
In the center south side section is the waiting room for parts customers.

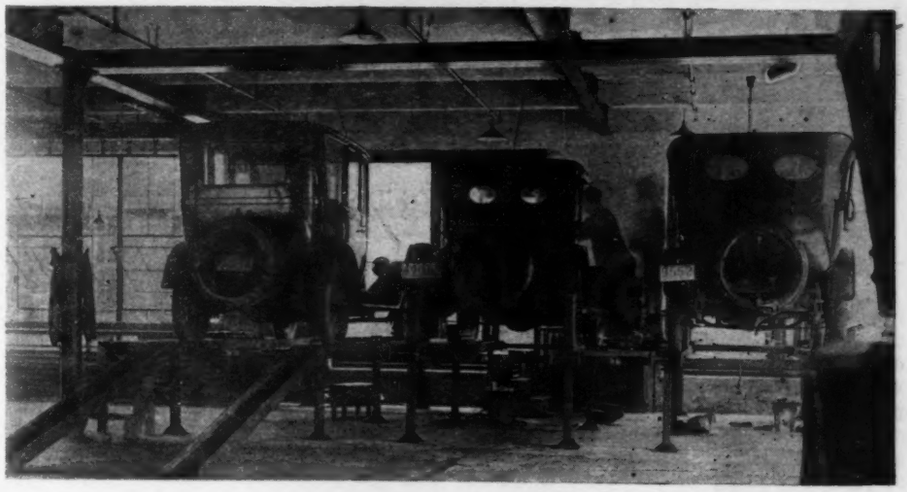
Directly back of the new car department is the used car section, utterly lacking in embellishment, but spacious, well lighted and spotlessly clean. All used cars in this section are clean and before being offered for sale are given an overhaul.

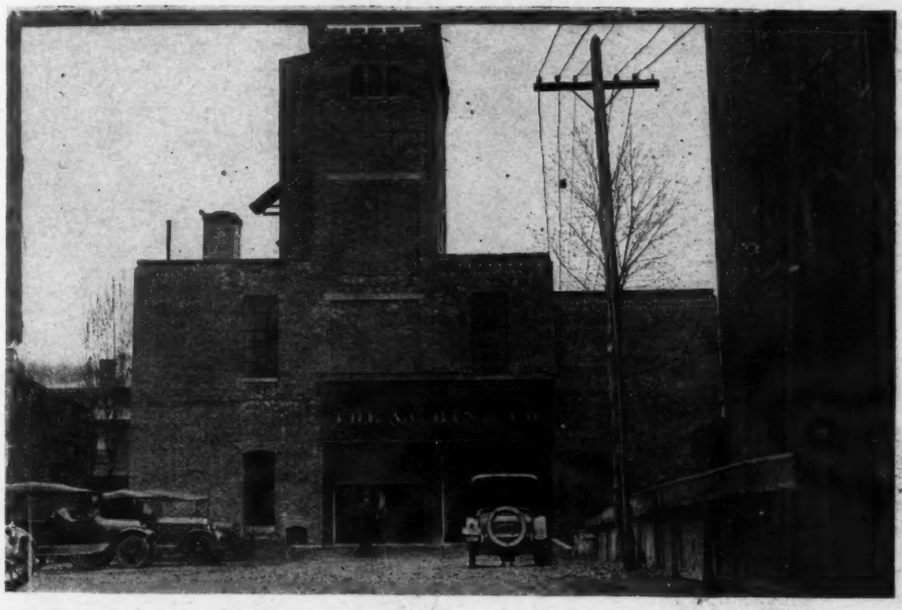
Using the Rear Section

West of the used car section is the quick service department, so-called, where the owner may drive in his car for minor repairs and adjustments that can be performed in little time. The entrance is from the yard at the west end of the building over a ramp. The yard is commodious and allows for the placing of many cars and when weather permits much minor repair work can be attended to here. Good use of the yard space is made for running in engines.

In the southwest wing of the building on the main floor is the parts department, bright, cheerful and airy. The lighter and smaller parts are stored here in bins and on racks which are properly numbered. The bin backs are coarse wire mesh. In good weather there is little need for artificial light which fact also holds good throughout the entire establishment since the walls are largely of glass set in steel sash. Entrance to the small parts department is from the south side of the building with a walk leading to the Washington street side. The mechanic or repairman does not have to parade through the new or used car departments when in quest of parts.







Top—The bins used in the A. C. Hine service station to stock small parts. Middle—Elevated steel runways used instead of the usual pits. This permits easy access to the under side of the car and provides plenty of light. Bottom—The commodious rear section where cars may be inspected

The entire second floor with full length windows in steel sash on three sides of the building is given over to the service and repair section, light, airy and well ventilated. There is endless equipment designed to expedite work and save time all of which works out to the benefit of

(*Concluded on page* 48)

AUTOGENOUS WELDING

WHAT IT IS AND HOW IT IS APPLIED

THIS is the second of a series of articles on autogenous welding and explains the function of the regulator. These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They also are intended as a reference for the man attending a welding school. It is likely that the first few months following his instruction will bring up many problems that may be solved more readily with these articles at hand.

Finally, this series should be of benefit to any automotive service man or repairman, even though he never intends to have a welding torch in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the automotive repairman.

PART II—REGULATORS

THE purpose of the regulator, Figs. 5 and 6, is two-fold. It reduces the pressure of the oxygen or acetylene, as the case may be, and maintains the gas constant at this reduced pressure. Just what pressure the gas is reduced to depends on the adjustment of the handle on the regulator. Ordinarily, the pressure may be anything from 0 up to about 30 lbs., depending on whether the regulator is for oxygen or acetylene and whether the tip is large or small. Naturally, zero pressure means that no gas is flowing and that the regulator is closed.

When the regulator is closed that portion of the intake passage called the nozzle is tightly covered by a seat which in a sense may be called the valve. The valve is mounted in a yoked sleeve which surrounds the nozzle. The opposite end of the sleeve contains a small spring which holds the valve tightly against the nozzle. The area of the nozzle is sufficiently small so that even if full oxygen pressure is turned on it will not be enough to overcome the counteracting force of the small spring.

Obtaining Five Pounds Pressure

Suppose now, that five pounds pressure is wanted on the torch. The regulator handle is screwed in until the gage shows this pressure. What happens inside the regulator? Screwing in the handle applies pressure to a very stiff spring which in turn forces in the diaphragm. This movement of the diaphragm pushes the sleeve to the right and thus moves the seat away from its nozzle and oxygen under pressure begins to flow into the passages (indicated in gray) and thus makes its way to the torch. But as soon as the pressure begins to rise in the diaphragm chamber, the diaphragm is forced to the left, counteracting the pressure of the big spring. Finally the pressure rises sufficiently in the chamber to push the diaphragm and the big spring back to their original position. Meanwhile the small spring in the sleeve has closed the nozzle and shut off the flow of oxygen.

Let us assume that the torch valves are closed and that in adjusting the oxygen pressure to five pounds that the adjusting handle was screwed in slowly, that the diaphragm vibrated back and forth many times as the handle was turned, when the pressure of five pounds was reached on the gage, the turning of the handle was immediately discontinued. The pressure in the diaphragm chamber stands at five pounds, the diaphragm is in its normal position and the nozzle valve is closed.

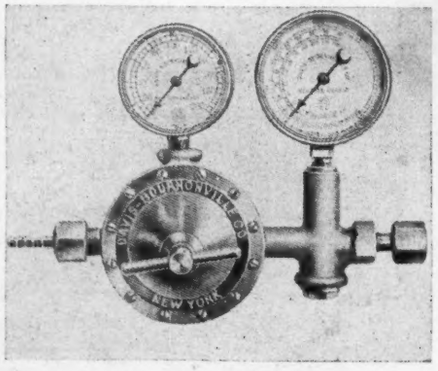
Now suppose that the torch valves are opened and that the torch is put into operation. Immediately the pressure begins to fall; the big spring forces the diaphragm to the right and the nozzle valve is thus pushed away from its seat so that oxygen is let in until the pressure rises to five pounds, by which time the diaphragm has moved back to normal position and the valve is closed again. This action takes place continuously, the pressure being regulated by the vibration of the seat on the nozzle.

Once the action of the regulator is understood it is plain to see that if the regulator valve is turned on first and the tank valve turned on afterward, particularly if the latter is opened suddenly, that the seat may be slammed against the nozzle so hard that serious injury will result. Hence, before opening the tank valve it is important to see that the regulator valve is closed.

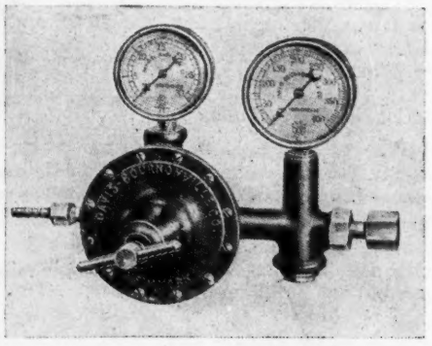
An Extremely Sensitive Device

At the same time to turn the full pressure of the oxygen tank on the regulator diaphragm might injure it. Considering the high pressures of the gases used, it is desirable to open and close all valves slowly.

The regulator is an extremely sensitive



Oxygen pressure regulator



Acetylene pressure regulator

Fig. 5—These illustrations show the oxygen and acetylene regulators with their gages. The acetylene fittings are painted red in this case to distinguish them from the oxygen fittings. The acetylene regulator has a gage registering 30 lbs. and another 400 lbs. The latter indicates the tank pressure which is 250 lbs. when the tank is full. The former shows the pressure of the acetylene gas delivered to the torch. This pressure varies with the size of tip and may be anything from 1 lb. for a small tip up to about 10 lbs. for a large one. The pressure is adjusted by the handle on the regulator. The high pressure gage on the oxygen regulator registers up to 3000 lbs., the pressure of the oxygen tank when full being 1800. The other gage shows the pressure of oxygen delivered to the torch. This pressure may be anything from 1 to 30 lbs. depending on the size of tip. This gage registers up to 200 lbs. The pressure is adjusted by the handle on the regulator

device and should be handled with the greatest care. It should never be dropped nor jarred. Neither oil, grease nor any other lubricant should be used on it. Dust and dirt should be kept out of it as far as possible, therefore, the dust plug should be inserted when the regulator is not in use.

The regulator should never be changed from one cylinder to another without taking the pressure off of the diaphragm.

No one except an expert should attempt to repair a regulator.

Diaphragms, valve seats, springs and other wearing parts should not be replaced except with other parts of the same make. Similar parts on diaphragms of different makes are not interchangeable.

In Next Week's Issue

GENERATORS

will be taken up and the process and precautions necessary to produce acetylene gas.

These articles on Welding are vital to the service business of the automotive dealer. The scarcity in parts which is now existant can be helped out by the rehabilitation of the old parts and in the case of broken parts, Welding is an important factor.

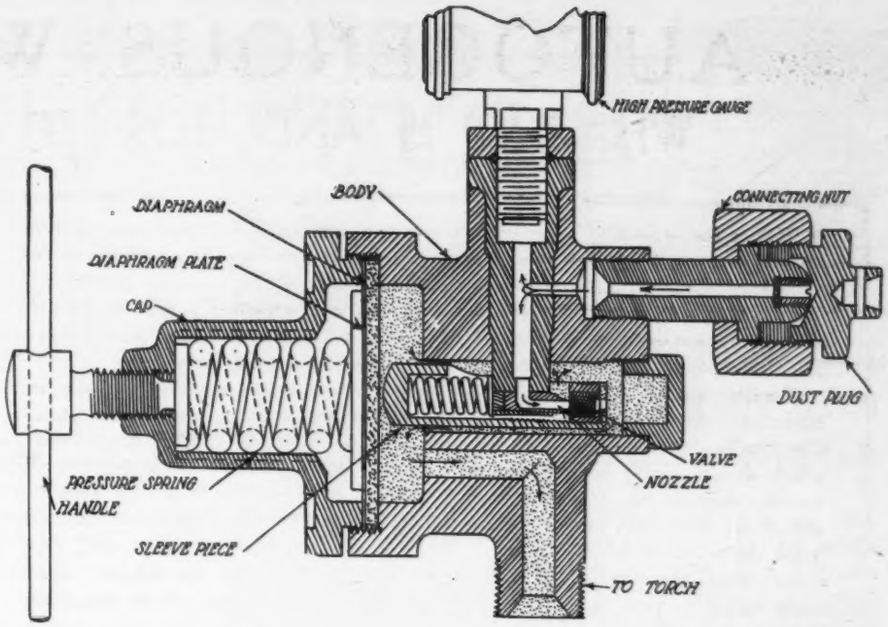
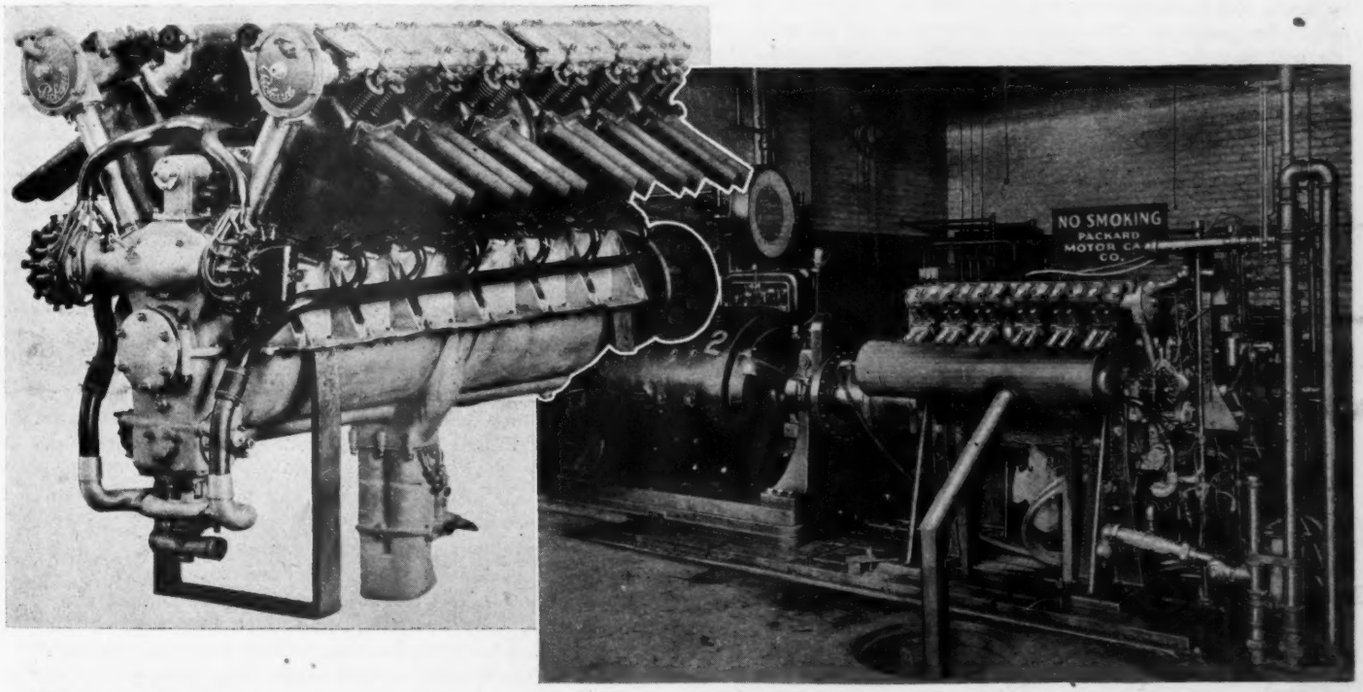


Fig. 6—This is a section through a regulator. The passages indicated in white show the path of the gas before it is reduced in pressure, and the grey passages show the path of the gas after it has been reduced. Pressure regulation is secured by the vibration of the valve seat against the nozzle opening. This seat is mounted in a yoked sleeve which is normally held closed by a small spring shown. Screwing down on the regulator handle applies pressure to the big spring and the diaphragm is forced to the right, forcing the seat away from the nozzle. Then the oxygen pressure rises in the diaphragm chamber and the diaphragm is forced back to its original position and then the valve is closed. This cycle is completed continuously, pressure regulation being obtained by the vibration of the valve against the nozzle. Pressure adjustment is obtained by screwing in on the handle

TESTING THE PACKARD 600 HP. AIRPLANE ENGINE



The giant aero engine, the biggest ever made in America, is here shown in its test on the dynamometer. In this test the engine is made to drive an electric generator, which is hung on ball bearings so that its impulse to turn over can be measured on the big scale beyond it. From this the horsepower is calculated. This engine, without changes after it came from the assembly department, turned out 578 hp. at 1920 r.p.m. It was not run at top speed for fear of overloading the dynamometer, and will ultimately produce 600 hp. This is expected to give a speed of at least 200 miles an hour when properly mounted. The big cylinders along the side in the picture are not a part of the engine, but are used to carry off the exhaust

EDITORIAL

TALK IT OVER WITH YOUR BANKER

IF THE dealer had striven toward greater intimacy with the banker, the rash restrictions which were put into effect recently would not be as comprehensive in their embrace as they are now. The banker has not been made to appreciate what the Automotive Industry means to the welfare of the nation and as a result when a general curtailment of credit was put into effect, the restrictions were applied without discrimination and without regard. Restricting the automotive industry can only restrict the nation's growth. If the banker were deprived of the use of his motor car could he travel from town to town and learn intimately of the conditions which prevail along the route? Could the farmer afford to lay up a tractor for a day while he hitched Dobbin up and drove into town for a part for his tractor, when the same could be accomplished in the time it was necessary to hitch up the horse? These and many other questions are little things that might be talked over with the banker in a friendly way. A dealer recently went in to see his banker and talked with him for about an hour. The chat, for that was all it was, no mention ever being made of personal matters, included a general interchange of ideas with regard to crops, merchandising in general and divers other questions. The motor car question was discussed and when the conference was over the banker said he felt better about the dealer's business and appreciated more fully just what the motor car meant to everyone. The banker is like every one else, but the cold reserve which always pervades the atmosphere in the bank seems to instill into every one the idea that when in the bank get your business done and get out. A frank discussion of the problems that confront you, with the man who does your financing will clarify the cloudy situation that exists today with respect to automobile credit.

PREPARE NOW FOR THE WINTER

IN SPITE of the fact that the repair shop is running day and night and we are almost gray-haired from worries imposed upon us by tourists and their troubles, the financial situation, railroad shortcomings and other causes too numerous to mention, we must not get into the class of the foolish virgins and forget to trim our lamps.

We in the northern states all know that Old Man Boreas is coming along just as sure as death and taxes and it behooves us to get ready for his advance guard.

We probably can remember some things that not only cost us unnecessary money last winter but made our salesroom or shop uncomfortable as well.

Perhaps our boiler was inadquate to handle our job in severe weather without forcing, and forcing means waste.

Perhaps, our front or back garage door had a crack around it through which we might "throw a cat." More waste, we can't heat the whole out-doors. This year above all others we must conserve coal, and by the way is our winter supply arranged, for late comers may get left.

This is the logical time to order and install additional heating equipment; later the heating men will be worked to death by belated procrastinators and it is to our advantage not to be one of them.

Let us make a few mental notes of things to do and get them done. For instance, that drain that froze up last winter and flooded the roof, rearrange it so that it will be ice free. The roof also may need attention. If the boiler is too small, maybe we can install an auxiliary to carry us through the cold snaps. That corner of the shop which was always cold should have a radiator. That exposed plumbing—protect it.

There are a hundred and one things which need attention in warm weather, so that they will be fit when the cold comes.

We are getting to be more of a twelve month industry every year and must keep things ship-shape in winter as well as summer—no more hibernating.

GOOD BUSINESS MANAGEMENT NEEDED NOW

SITTING idle, glorifying ourselves during the period just passed, complimenting ourselves on the unprecedented volume of business, has been very bad for our sales departments. Instead of the development of sound and bomb-proof campaigns, we have languished and let development for the future be side-tracked. Production is decreasing. These dealers with the best developed sales plans will make the best showing in their territories. The best service rendered will be conducive toward the best satisfied customers, and it is these dealers with good selling campaigns and good facilities to render service who are going to succeed in the coming sales battle.

There is a lot of talk of the automobile business taking a slump that will wreck everything clinging to it. Let us not discount the situation with an idle pshaw and say, "Well, we're selling cars, and all we can get, so why worry. The orders seem to come drifting in. We don't have to work so very hard to get rid of cars." This fellow ought to get a bump. As for the rumors of the industry going to the rocks, we scarcely credit them with sufficient strength to circulate upon their infirm founding. But things will tighten up somewhat, just as they are doing in all other forms of enterprise. When a general curtailment is in order there is no one business immune. The past history of the automotive business shows that it has always been the last to be affected by any curtailment and the first to recuperate. Witness the last example brought home so forcibly during the war. Did not the factories operate during the war and turn out cars? Of course, some of them went into war work one hundred per cent and practically every one had some war work. After the war the first business back on its feet was the automotive business. It set a pace for the other manufacturers of the country and pointed the way for them.

A little forethought, of the descerning and searching kind exercised now, will produce the feeling of confidence that is so necessary toward the achievement of success when everyone else has a long face and sees only the blue side of the future.

Manufacturers' Credit Managers Discuss Future Policies

Present Credit Situation Temporary—Relief Promised Following Crop Movement—Tighter Money Stabilizing Industry and Eliminating the Undesirable Shoe-String Operator

DETROIT, July 23—Extraordinary efforts to promote production through a sales policy following the line of least resistance was held to be the cause of the present conditions in the automotive industry at a meeting of the credit managers division of the Motor & Accessory Manufacturers' Association here today. Despite the unrest resulting from reports of financial troubles and slowing up in demand a careful survey of the situation generally lent an air of optimism and it was the consensus of the meeting that the condition was only temporary and would be overcome in from 60 to 90 days.

Attack Problems Squarely

There was no mincing of words and no effort to deal delicately with the situation as regards conditions existing at factories throughout the country. One by one they were taken up and conditions, as revealed by cancellations and deferments of orders for parts, existing in each factory were gone into. Every angle of the situation was discussed in the effort of the credit men to formulate a policy for carrying accounts and credit extensions.

An outstanding feature of the meeting was the attitude of the parts and accessory manufacturers to co-operate in every reasonable way with the automobile manufacturers in the matter of deferring orders and cancellations where there appeared no alternative. The spirit of give and take was in evidence and the inclination to stand firmly behind the automobile manufacturers in so far as possible was apparent.

A gratifying condition existing among the factories as regards finances was shown by the reports. It was made apparent that the condition which has brought about production curtailment of 35 to 40 per cent was due almost solely to the financial stringency as it affected the dealers with the unbalanced inventory as an aggravating factor.

Credit On Merits

It was brought out at the meeting that the fright caused by the Federal Reserve Bank injunction in Kansas City and which appeared to spread to a greater or less extent throughout the country rapidly was wearing away and bankers were becoming more inclined each day to construe the Reserve Bank edict more liberally. In fact it was shown beyond question that the matter of dealer financing purely is an individual matter and one that rests solely with the dealer and his banker.

R. M. McConnell, vice-president of the National Bank of Commerce, addressed the meeting and was plied with questions regarding the banker's attitude, his replies convincing the managers that there was no inclination on the part of bankers to discriminate against the automotive industry.

Mr. McConnell took occasion to take a sharp rap at the discount companies, characterizing them as the worst leeches in industry. He said bankers were in business for profit and where they could see profit to be made by a safe loan there would be no hesitation on their part. The problem before the automotive industry, he said, was one of educating the bankers to a realization that this is a profitable business and convincing them that automotive paper was worth handling first rather than through rediscounting a financing company's paper, thereby letting the bank make the profit. He urged that bankers be shown the advisability of giving bankers acceptances for 90 days on bills of lading which are subject to rediscount, whereas, certificates of deposit are not.

Money Needed to Move Crops

Mr. McConnell assured the meeting that the attitude of the bankers of the country toward automobile dealers was getting more favorable every day except possibly in the Kansas City district. He declared the situation was strictly one of individuality and said where a man or a firm is carrying a good balance and is sound financially with a good business it would be suicide for a banker to cut his line of credit.

The situation as it exists with the dealers, Mr. McConnell said, would continue in his opinion for the next six months at least. He declared the solution lies in the manufacturers sending their representatives over the country to visit the bankers with the dealers and show the small banker where it would be a profitable undertaking for him to stand firmly behind the dealer. Capacity and financial stability alone will guide the bankers in the future, he said, and contended that the present conditions would prove of the greatest benefit to the industry.

Money today is easier, McConnell said, and will be for the next few weeks. Probably there would be tightening during the latter part of August which would continue through September and October during the fall crop movement.

Plan Own Financing

It was brought out at the meeting that a half dozen of the larger companies are planning acceptance corporations to supplant the private financing companies. It was agreed that the manufacturer's sale is not completed until he has his money and it was the opinion of the meeting that the manufacturers had become reconciled to that fact.

A representative of a leading engine manufacturing company declared the weakness of the industry today was due solely to the sales policy of the dealers, many of whom, he said, were taken on because of their character qualifications without regard to the shoe-string bank roll on which they expected to do business. The fact that the production curtailment which had been caused by a slowing up in orders, aggregated only 35 per cent on large cars, 20 per cent on small cars and nothing on trucks, indicated the demand is secure and there is no drastic curtailment of orders in sight. He said his company had car and truck orders to run them a year.

Labor Employment Increases

It developed at the meeting that contrary to reports which had gone abroad there were 403 more men employed in Detroit factories, the week ending July 13 than the week previous. Production curtailment now ranging around 35 per cent, it was believed, would drop to between 20 and 30 per cent and continue that way for an indefinite period. This conclusion is based on the indications shown by the order book of the parts and accessories manufacturers.

An official of a magneto manufacturing concern declared the heavy orders within the last year were attributed to over-enthusiasm and said the present lull was inevitable as the result of such conditions, likening it to the feeling of exhaustion that follows enthusiastic cheering for a popular hero. He also urged that many manufacturers were prone to encourage new automobile companies without proper financial banking to enter the field. He said, on the other hand, they should be discouraged and every effort made to confine the industry among corporations with sound and sufficient financial backing. He said his company's business indicated an increased foreign demand and said many of the automobile manufacturers jumped to the opportunity in the foreign field when the lull came in the domestic demand.

Condition Temporary

An official of a leading axle company said dealers were badly handicapped, particularly on account of bank restrictions. He said there had been a check on the automobile industry and declared there was nothing for the manufacturers and dealers to do but adjust themselves to conditions until after the crops had been moved, when banks would be inclined to be more lenient with automobile paper and take care of the dealers. He expressed confidence the condition was only temporary and said there was a slowing up in production of larger cars among both good and bad companies, but said the lower priced car manufacturers were pushing his company steadily.

Concluded on page 41.

Detroit Edison Co. Orders 50 Per Cent Power Reduction

Manufacturers Installing Own Power Plants and Will Be Able to Maintain Production

DETROIT, July 23—An order cutting power supply to Detroit factories 50 per cent during the daylight hours was issued to-day by the Detroit Edison Co. in the form of a request effective Monday and to continue an indefinite period, at all events until November 1. While the order does not become effective for three days manufacturers are urged to organize their plants for compliance as quickly as possible.

With the automotive factories in Detroit and vicinity already burdened with problems of financing and transportation this latest handicap necessarily will work serious hardships. Practically all of the automotive factories are served by the Edison company and will be affected to a certain extent.

Coming at this particular time and for the next few weeks, the order will not prove as serious a handicap as it will later on. Lack of demand, tight money conditions hampering dealers and the near approach of the end of the fiscal year necessitating the annual inventory has caused production curtailment in all factories and the loss of power will not show an immediate serious affect. All of the factories, however, have planned for a resumption of normal operations during September and October and without the full quota of power from the Edison company they will be hampered greatly in production.

To Furnish Own Power

As soon as the order was received most of the manufacturers began making preparations for installing their emergency power plants, with gas engines and tractors, developed during the fuel shortage last winter. These emergency plants will enable the factories to maintain operation with the help of the 50 per cent normal power available from the Edison company and by shifting forces in various ways.

The Edison order carried with it instructions to manufacturers to make such shifts in operation as were best suited to their conditions. The only stipulation is that they must not consume more than 50 per cent of their normal consumption of power during the day. Night shifts were suggested; the order stating that such shifts must not begin operations until 10 o'clock at night.

What steps the various factories will take to overcome the handicap has not been announced generally. Hudson and Essex plants laid off a majority of their forces yesterday morning with instructions to return to work Monday. It was denied officially that the plan at these factories will be to work three days a week for a time. The only departments affected were those where Edson power is used. All other departments are operating.

Maxwell-Chalmers has been closed several days officials announcing that the shut-down was due to the annual inventory. It was said the plants would resume next week and no further announcement has been made, though it was stated unofficially to-day, that work in those plants might be further postponed as a result of the fuel order. The Ford Motor Co. which uses about 10,000 kilowatts will not be handicapped seriously. The company has its own power plants as has also Packard Motor Car Co., which is almost independent of Edison. Both companies will continue production around normal.

Hampers Production

Paige, Cadillac, Dodge, Columbia, Liberty, King, Scripps-Booth and Hupp will be effected, to a greater or less extent, when the fall schedules are entered upon after September 1, but meanwhile will equip their plants with emergency power facilities sufficient to carry them through. Under present production schedules, the loss of the 50 per cent power will not prove a great handicap to any of them.

TO DECIDE CHAMPIONSHIP

Columbus, O., July 26—A triangular race contest between Gaston Chevrolet, Tommy Milton and Ralph Mulford to decide the championship on a dirt track, will be held in Columbus August 1, under the auspices of the Columbus Automobile club. Negotiations for the race, which will be one of the most important of the season, have been going on for some time and were finished when Ralph Mulford wired that he would accept the challenge of the other two racers. The race will be for a purse of $10,000, all of which will go to the winner.

INVESTIGATE FUEL SHORTAGE

San Francisco, July 27—Valuable first-hand information on the gas shortage situation is contained in the official report of Robert W. Martland, secretary of the California Automobile Trade Association, who has just completed a two-week survey of the entire oil situation in this state. Martland's investigation was complete in every respect as he visited every oil field of importance and questioned the officials of each of the larger oil-producing companies of the state.

The gas shortage will be a thing of the past, perhaps as early as August 15, he believes, and there will be no recurrence of this year's troubles the coming season, he states.

Charges that the gas shortage was the result of fictitious causes, that it had been "engineered" by the oil companies were found to have been without foundation of fact. The present gas shortage resulted from natural causes and the opening of new fields by federal act, together with the application of the new processes for "cracking" gasoline will end it just as naturally, Martland believes.

Coast Fuel Famine Works Hardships Among Motorists

Mixture Being Sold at Some Stations Which Will Not Burn in Engines

LOS ANGELES, July 26—The acute shortage of gasoline has become an actual famine here. The best known sign to motor vehicle operators reads "No Gas" and it hangs on the tanks of fully two-thirds of supply stations in the city. The shortage has been extended to neighboring cities and towns and there is no relief in sight. One-half the motor vehicles in this part of the state are out of operation, because their owners cannot get gasoline. Passenger car dealers say the situation already has begun to affect the sale of cars.

Whether the shortage is artificial and created purposely by the oil companies, or whether it has come about because of inability to keep the demand up with the supply is something almost everybody would like to know. The oil companies ridicule the claim the shortage is artificial but the public at large does not accept their contention. The public points to the fact that already this year from Los Angeles harbor more than a million gallons of gasoline has been exported as against a total export of about 300,000 gallons last year.

Try to Class as Utility

There is a great clamor to have gasoline classed as a utility and in this way bring the entire business under the jurisdiction of the state commission. The card rationing system has been proposed, but the oil companies will not submit to the plan and there is no legal way to compel them to do it.

All sorts of schemes for fraud and thievery are being perpetrated. Mixtures are being sold as gasoline that will not burn in an engine. Usually there is enough gasoline in the tank or carbureter to let the purchaser drive out of sight of the station where he bought the mixture and then his engine fails. Instances have been cited where this fake gasoline was drained from the tank onto the street and it could not be ignited with a lighted match. Thieves have been syphoning the gas from tanks of cars that are parked on the streets. Instances are related that where the petcocks on some tanks could not be turned, the tanks were punctured.

The charge has been made in the City Council that the oil companies have created the present shortage to carry out their threat that they would force Los Angeles to remove its gasoline standard. The oil companies have petitioned the removal of the standard but have not succeeded in getting it set aside. Confronted by legal obstacles they now are seeking to curtail the gasoline supply and thereby arouse public sentiment to such an extent that the city will be compelled to remove its standards, according to the claims.

Reasons Why Farmers Should Buy Trucks

Uncle Sam Makes An Investigation Among 753 Farmers and Develops Information of Value to the Dealer Whose Job Is Selling Trucks to Farmers

WASHINGTON, July 25—Analysis of the reports of 753 farmer-owners of motor trucks, made by the Office of Farm Management and Farm Economics received during an investigation in the eastern states, shows the growing popularity of this form of transportation in agricultural communities. Ninety-five per cent of the farmers express the belief that their trucks will turn out to be profitable investments, and above all, efficient time savers. The result of the survey, made public recently, is the first of a series which the Government is conducting throughout the country in an effort to find the true sentiment of the farmers as to the necessity and usefulness of motorized equipment.

Send Out Questionaires

The questionnaires sent out by the Department of Agriculture proved conclusively that the farmers believe poor roads are the only drawback to the successful and economic operation of motor trucks. Judging from the comments of these truck owners, increased sales will depend largely upon the ability of dealers to promote the good roads movement in their territory.

The initial investigation of the Federal agency was conducted during the past few months among the farmers of Maine, New Hampshire, Vermont Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware and Indiana. The questionnaires were confined to farmers who used motor trucks on their own farms. They were asked to report on several items, principally the cost of operation, the use to which the trucks were put, types and sizes of their farms, the advantages and disadvantages of trucks for farm use and other opinions of actual truck owners and operators. It is a noteworthy fact that the rated capacity of a very few of the trucks reported exceeded two tons. About one-half of the trucks in use on these farms are of the one-ton size. It was brought out that one-ton trucks are preferred by farmers in these localities. Commenting upon the trucks now in their possession, about 50 per cent of the owners of one-half and three-quarters ton trucks expressed a preference for larger sizes.

Small Trucks Favor Pneumatics

The survey showed clearly the owners of the smaller trucks prefer pneumatic tires while owners of one-ton trucks were about evenly divided in their preference. Farmers operating large trucks were generally in favor of solid tires.

The average cost of operation of the ½-ton trucks was about 8 cents per mile; of the ¾-ton trucks about 13 cents; of the 1-ton about 12 cents; of the 1¼ and 1½-ton about 19 cents, and of the 2-ton about 20 cents.

DO YOU SELL TRUCKS?

If in your field of sales there are farmers who need to be sold on your truck you may be able to use in your sales work many of these points which were found through a Government investigation.

The average cost of hauling crops, including the value of the driver's time at 50 cents an hour, was about 50 cents per ton-mile with the ½-ton trucks, 34 cents with the ¾-ton, 26 cents with the 1-ton, 24 cents with the 1¼ and 1½-ton, and 18 cents with the 2-ton trucks.

Average Life Seven Years

According to the Government returns, owners estimate their trucks travel, on the average, 3820 miles per year and are used approximately 173 days a year. Depreciation of the equipment is accepted as the largest single item of expense. The questionnaires showed that the average life of the trucks ranges from 6½ to 7 years. In the investigation of truck operations in these eleven states, it was found that over two-thirds of the trucks had not been out of commission when needed for a single day during the year covered by the report. Of particular interest to the truck manufacturer and salesman is the statement that a large percentage of the truck owners advised the Government that they had not lost any appreciable time on account of engine and tire troubles while operating over all types of roads.

Wider Range of Markets

A study of the statistics made it clear that about one truck in thirty had been out of commission ten days or more. Considering the roads and other difficulties, the truck owners considered this average as remarkable. The roads usually traveled by these motor vehicles are all, or part, dirt. About eight weeks of the year the highways are impassable to motor trucks. Eighteen per cent of the farmers reporting are less than five miles from markets. Twenty-five per cent of these truck users are twenty miles or more from marketing centers. On return trips, more than one-fourth of the farmers have loads. Of the owners reporting to the department, 25 per cent were occasionally engaged in custom hauling which netted an average of $174 a year.

The value of the truck to the farmer is fittingly illustrated in the admission that the motor truck has enabled the farmer-producer to change markets, therefore, demanding better prices for farm products. Where the average distance to the old market with horse-drawn vehicles has been seven miles, the motor truck allows the eastern farmers to penetrate the surrounding country for 20 miles in search of good markets. As compared with horses and wagons, trucks save farmers from one-half to two-thirds of the time required for hauling materials. Throughout the eleven states, horses were used mainly for road hauling. The farmers expect to do away with their horses whenever road conditions insure the constant use of motor vehicles.

Decrease Hired Help Cost

About four-fifths of the men state that their trucks decrease their expense for hired help. On the average they estimate that this decrease amounts to $324 per year.

Over half of the 205 truck owners whose farms contain more than 120 crop acres own tractors. The number of work stock kept on the farms where both truck and tractors are owned is only slightly less than the number kept on farms of corresponding size where only trucks are owned.

After a careful study of the reports from the eastern districts, the Federal specialist in farm power said of the survey: "It would certainly appear that any saving attributable to the motor truck on the farm is in time saved rather than in expense. Most of these men think that the profits accruing from the saving in time more than overbalances any extra expense entailed by the use of the motor truck. It is significant that the majority of these farmers are located a considerable distance from market, more than four-fifths of them being five miles or more from their shipping points, and the saving in time effected by their use of trucks is naturally greater than it would be on the average farm, which lies nearer to market than do most of the farms concerned in this investigation. The experience of the 753 farmers who have contributed to this study should enable the farmer himself to judge with a fair degree of accuracy as to whether the motor truck would prove advantageous under his conditions.

LATEX RUBBER IN PRODUCTION

Fond du Lac, Wis., July 26—After encountering heavy obstacles in the matter of getting delivery of machinery and equipment, the Latex Tire & Rubber Co. of Fond du Lac, Wis., was able during the past week to start its new factory on regular production. Supplies of materials are ample to keep the plant busy at its normal capacity for several months.

Dealer Provides Flat-Rate Emergency Service Plan

For Nominal Sum Agrees to Render Assistance in Case of a Breakdown

PHILADELPHIA, July 27—The Johnstown Auto Equipment Co., Johnstown, Pa., which recently entered the automotive equipment field, has created a new branch in its emergency service department, which is a novelty.

For a nominal sum the company agrees in a contract to render all possible emergency service to the holders of these contracts, in cast of a breakdown within five miles of the company's quarters. The contracts hold good for one year. Following is the contract "form":

JOHNSTOWN AUTO EQUIPMENT EMERGENCY SERVICE

The Johnstown Auto Equipment Co., Johnstown, Pa., for the sum of three dollars, hereby agrees to render all possible automobile emergency service to the holder of this contract, for a period of one year from the date of this contract.

This service shall be as follows:

1—It shall consist of emergency repairs only. In case shop repairs are necessary, the Johnstown Auto Equipment Co., whenever possible, will tow the car either to the owner's home, if residing within said limit, or to the Central Garage, where the owner can make the necessary arrangements for these repairs in the usual way.

2—It shall be available in Johnstown and vicinity for a radius of five miles from the store of the said company, day or night.

3—The cost of materials shall be the only additional charge for this service.

4—This contract is not transferable and the right to cancel it is reserved by the Johnstown Auto Equipment Company, who will refund the said sum of three ($3.00) dollars.

5—This contract shall be applied only to emergency repairs on a ..... car, model ....., Engine No. ....., owned by ....., St. Ave.

Signed this .....th day of ....., 1920.

It will be noted that an accessory concern wishing to inaugurate this sort of plan, might make an advantageous arrangement with a garage, as in this case, provided the organization has no repair shop.

PLACE BUMPS TO SLOW UP DRIVERS

Atlanta, Ga., July 27—What many believe to be one of the most novel and unusual means of preventing automobile accidents at Railroad grade crossings is contained in a bill that has been presented to the Georgia State Legislature now in session, and that will probably come up for a final hearing before the assembly adjourns. Its authors believe it will be the means of doing away with seventy-five per cent of the automobile grade crossing accidents. The bill has already been heartily approved by railroad executives and many of the county boards of the state.

The plan suggested and that will become a compulsory law if the bill passes the legislature, provides for a series of inclined bumps in the highway for 100 ft. on each side of a railroad grade crossing. These bumps would be no less than five inches in height and no more than eight inches, and extend entirely across the road. An automobile striking this series of low inclines would naturally be compelled to slow down, and at the same time the driver would be warned, either day or night, that a grade crossing was close at hand.

Considerable interest is being manifested by the public in the ultimate fate of the bill which appears to be heartily supported as a tangible means of accomplishing the much desired result of reducing to a minimum automobile accidents at grade crossings.

ANTIGO TRACTOR READY

Antigo, Wis., July 26—The Antigo Tractor Co., organized a year ago at Antigo, Wis., is completing five working models of the Four-Wheel-Pull tractor and is preparing to engage in quantity production. The first tractors are being built under contract with the Murray-Myirea Co., Antigo, but the intention is to equip a separate plant before the end of the year.

REMY BROS. PURCHASE PLANT

Indianapolis, July 26—The return of the Remy brothers, founders of the Remy Electric Co. of Anderson, Ind., to the electrical manufacturing business, was made certain this week when they, together with Charles G. McCutcheon, purchased the plant of the Hercules Electric Company of Indianapolis.

It is understood that the consideration was $250,000. The Hercules company is an old and well established one and has manufactured a line of magnetos and electrical devices that has been on the market all over the country. The plant will be enlarged considerably and work on these improvements will be begun at once. The new company will be known as the Hercules Manufacturing Co.

HOOSIER SHOW ENTRIES INVITED

Indianapolis, July 27—The Indianapolis Automobile Trade Association is now ready to receive applications for space in its twenty-first annual automobile show which will be held in the Manufacturers' Building at the Indiana State Fair Grounds during the State Fair, September 6-11. Exhibits will consist of passenger cars, trucks, and accessories. All applications for space should be sent to the office of the association, 338 N. Delaware St. John Orman, head of the Indianapolis Automobile Trade association, will again be in active charge of the show this year.

System Enables Dealer to Know Cause of Service Delay

Keeps Repair Shop Free From Jobs Held Up Because of Missing Parts

DETROIT, July 26—Al Zeckendorf, distributor of Cole, Chandler and Cleveland cars in Detroit, has inaugurate a service check system that is proving of great value to him in the conduct of his service station, as well as to the car owner. The plan evolved was designed to minimize delays due to carelessness and keep the service station as free of repair jobs as humanly possible.

Zeckendorf had a form printed containing colunms for the car numbers, owners' names, date in and out, cash and credit charges, labor and material charge with a footnote wherein is shown delayed jobs and the reason for the delay in repairs. In the footnote is a column showing the date a missing part is ordered, who ordered from and remarks.

The form is printed in triplicate, one being kept by the stock room, one in the service station and the other going direct to Zeckendorf. The report is made up each day so that Zeckendorf knows at the end of the day what if anything is delaying completion of work and exactly where responsibility lies. Heretofore, as in all service stations, neglect to order parts promptly, resulted in cars being held in the repair shop several days with no definite check on the person responsible for the delay.

Aside from the confusion and hampered working conditions caused by the station being loaded up with repair jobs, the anger of owners over continued delays in making repairs to their cars was a source of constant worry. This happily is eliminated by the daily check system.

GOODYEAR HAS BIG STOCK SALES

Akron, O., July 26—Frank A. Seiberling, president of the Goodyear Tire & Rubber Co., in a statement just issued by the company, states that the stock sale in the $30,000,000 issue which closed July 15, reached $26,000,000. The stock was offered in blocks of two shares of preferred and one of common stock, and the statement says there were more than 20,000 investors. Many of the Goodyear employees bought blocks.

VESPER OPENS OKLAHOMA BRANCH

Kansas City, Mo., July 22—Walter Vesper, president of the Vesper Motor Co. of Kansas City and President of the Dunlevy Motors Co. of Dallas, Tex., will soon open a new distribution station for Reo passenger cars and speed wagons in Oklahoma City, Okla. Mr. Vesper will be president of the new Vesper Motor Co. with Roy C. Dunlevy, secretary and treasurer of the Dunlevy Motors Co. of Dallas.

Dealer Organization Needed to Best Protect Interests

Each Member Must Take an Active Concern in Order to Make Influence Felt

BOSTON, July 27—As a result of activities on the part of the National officers of the National Automobile Dealers' association, the work of enlarging the membership in New England has taken added impetus lately.

"That there is need for organization any one will admit," said Mr. Shorey, vice president for Massachusetts, "but the trouble is to get men to do the work. You cannot join an organization and sit back being content merely to pay dues. In these days there is too much at stake.

"Take the credit situation at present. The banks were shutting down on the motor dealers throughout the country, and that made it hard to finance their deals. Things have changed for the better since the officers of the N. A. D. A. and some of the manufacturers got busy with financial powers.

"But that is merely one item. Take legislation. Every year the motor vehicle-car and truck is generally the target of inimical legislation. A few men do the effective work at the State House. But all the owners and dealers benefit by it.

"Now dealers who are protected in legislative matters should bear their share of the burden. The stronger we grow, the more effective we become, and we cannot grow without funds to pay the expense of securing members, sending out literature, etc.

"That is why every dealer in the state should get behind the movement to increase the National association by joining an organization in his own city If there is not one there, steps should be taken to form one. If the jewelers, piano makers, rubber trade and scores of other business lines can organize there is no reason why the dealers cannot do the same thing."

ATTEMPT TO LIMIT TRUCK SIZES

Bangor, July 26—It is reported that an effort will be made at the next session of the Maine Legislature to limit the size of trucks which can be operated over Maine highways to two tons. Many are questioning whether this would be practical.

In the drive of 1919 to put the $10,000,000 highway bond issue amendment across, one of the arguments was that unless Maine could have better roads it would be impossible successfully to operate motor trucks, and that trucks were going to be the big essential in the movement of crops and factory products.

While legislation such as proposed would not absolutely prohibit the use of trucks in this state, it would so limit them that, according to men interested in the work, motor traffic would be defeated. In anything excepting short hauls, say these men, the less than five-ton truck is not practical. Its cost, in proportion to the load it will carry, bars the two-ton machine from long hauls.

While a law prohibiting the use of trucks of more than two tons' capacity upon a gravel macadam way might be advisable, because it is readily admitted that roads of this character will not stand up under the heavy truck traffic, the question is raised as to what sort of highways is Maine going to build with this $10,000,000.

SEEK TO ALTER DOUBLE TAX BILL

Manchester, N. H., July 22—James T. Sullivan of Boston and A. J. Shorey, vice-president of the Massachusetts branch of the National Automobile Dealers' association, were among the speakers at a gathering of the New Hampshire Retail Automobile Dealers at the Derryfield club in this city.

The chief topic of discussion was the present method of automobile taxation in this State, dealers claiming that it practically amounts to a double tax in one year in many instances in that it compels an owner, who pays a tax on a car early in the year and later turns it in in trade for a new machine, to pay full tax on both, no rebate being provided for under the law. The purchaser of the second car also has to pay a tax; the law providing that the tax shall be paid before registration is issued. It was voted to seek a modification of the law at the next session of the Legislature.

CONDUCTS JORDAN ECONOMY RUN

Boston, July 27—A three-day economy test of 150 miles per day was concluded Saturday morning by a Jordan stock car. The test was conducted by the Hinchcliffe Motor Co. as part of a country-wide demonstration by Jordan dealers. The rules of the test called for the driving of the car 150 miles a day for three successive days over a variety of roads. The Jordan covered the 450 miles in the three days with an average of 21.9 miles to a gallon of gasoline.

On Thursday the car was driven to Buzzards Bay and Sagamore and back and made an average of 21.4 miles per gallon. Friday in a trip to the North Shore to Newcastle, the car averaged 21.9 and Saturday in a run toward Springfield, the average was 22.4 miles per gallon.

OPEN NEW SAMSON BRANCH

Indianapolis, July 26—The Samson Tractor Co., division of the General Motors Co., has taken over the salesroom formerly occupied by the W. E. Jackson Sales Co. at Capitol Ave. and North St. The company carries a complete line of Samson farm tractors and trucks and has the distribution of Samson products for Indiana and Kentucky and will employ more than twenty persons when it gets under way. J. T. Campbell is general manager of the Indianapolis organization.

More Accurate Time Cards Advocated by Toledo Club

Slackness in Recording Time Results in Overcharge to Owner and Loss to Dealer

TOLEDO, July 26—The Toledo Automobile Trade association of Toledo, with Raymond T. Skinner as secretary, is making good progress in co-ordinating the work of the various branches of the industry. There are ten trustees, two each from the passenger car, truck, tire and accessory, electric vehicle and battery service, and garage and repair shop divisions.

The garage and repair shop division has recently been active in its endeavors to remedy some abuses of garage service generally, particularly the slackness with which service men keep the time cards. This often results in an overcharge to the client. It is felt that the men themselves will be the first to recognize the all-round advantage of keeping exact time on a job, providing the garage owners put the problem before them in a convincing way.

The local garage and repair shop owners have agreed that they will be more exact in their promises to patrons regarding the time a job will take and the approximate price.

AKRON I. H. C. NOT TO MOVE

Akron, O., July 26—W. R. Dray, general superintendent of the trucks works of the International Harvester Co. located here, is authority for the statement that the reports in circulation here and in Rockford, Ill., to the effect that the motor truck works would be moved to the latter place are without foundation. "It was never contemplated," he said, adding that the I. H. Co. motor truck works are permanently located in Akron.

FEDERAL UP TO SCHEDULE

Philadelphia, July 27—William H. Bartleman, manager of the Federal Motor Co. of Detroit, announces, on his return from a trip to the factory, that, in spite of the difficulties in transportation and securing materials, the company has produced half of its contemplated yearly production in the last six months. Plans have been made and orders for material placed for a considerable increase in production for 1921. A large building is being erected to provide space for the new machinery to be used to increase this production. Plans also are being prepared for other large extensions on the sixty-three-acre site just purchased.

PLAN TRUCK TOUR

Denver, Col., July 20—A thirty-day, ship-by-truck tour is being planned by dealers in the truck division of the Rocky Mountain Automobile Trades association. Thirteen counties in Eastern and Northern Colorado will be covered.

Gary Dealers Stage Reliability Run and Hold Business Sessions

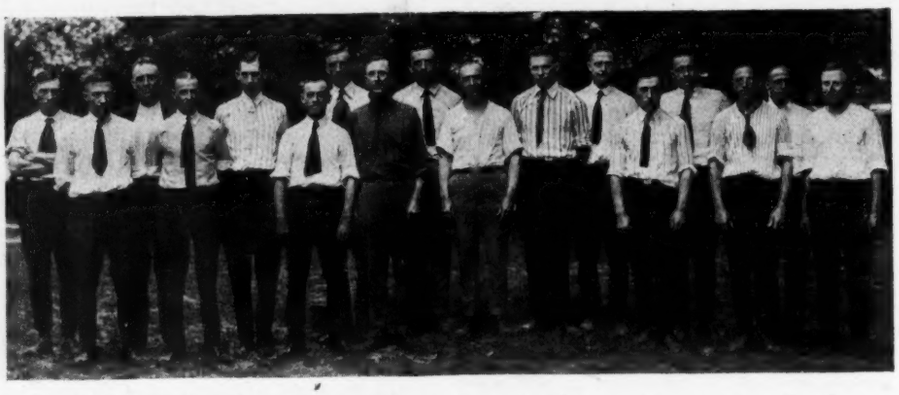
GARY, IND., July 23—The dealers of Gary staged a three-day reliability run from Gary, Ind., to the Shades, one of the scenic beauty spots of that state, the run starting Wednesday morning at nine o'clock and being completed early in the afternoon of Friday. First prize was captured by a five-passenger Buick. Twenty-five cars were entered in the run and were divided into four classes, the classification being made according to price and was as follows: Cars ranging in price from $2200 to $5000, class one; cars ranging in price from $1800 to $2200, class two; cars ranging in price from $1200 to $1800, class three, and from $450 to $1200, class four. Cars in class one were Hudson and Franklin, entered by South Shore Auto Co.; Cadillac and Stephens, entered by Verplank & Swigart; Paige, entered by Gary Motor Sales; Cole Eight, and Oldsmobile Eight, entered by C. D. Geiger; Peerless, entered by Beacon Auto Supply Co. Cars in class two were Buick seven-passenger, entered by Fifth Avenue Garage; Grant, entered by Moore Auto Sales Co.; Nash by Gary Garage & Sales Co.; Columbia, by Moore Auto Sales Co.; Essex, by South Shore Auto Co.; Reo and Auburn by City Auto Sales; cars in class three were Dodge, entered by Steel City Motor Sales; Scripps-Booth by Gary Garage & Sales Co.; Buick five passenger by Fifth Ave. Garage; Oakland by South Shore Auto Co.; Dixie Flyer by Tri-City Motor Sales; Oldsmobile Six by C. B. Geiger. Cars in class four were Dort, entered by South Shore Auto Co.; Chevrolet by Gary Garage & Sales Co.; Overland by Overland Fudge Co., and Ford by O. N. Bunnell.

The sweepstakes of the run was won by the Buick five passenger car driven by H. C. Dorman, with a total of 586¾ points. The actual running time was 8 hrs. 36 min. for the round trip. Starting with a credit of 500 points the car gained 264 points on a time allowance of 13 hrs., and three points for delays at bridge and rail crossings. The penalties imposed were as follows: 22½ gal. of gasoline consumed on run 101 points, 15 quarts water taken on run, 60 points, one quart of oil four points. Going into second speed 5 points. For ten minutes stop the penalty was ten points. For work on the car, three points. The Buick is a class three car, and takes the blue ribbon for first in that class as well as the silver cup for the sweepstakes.

The nearest competitor of the Buick was the Overland Four which ran 572¾ points; Chevrolet entered third with 567¾; Scripps-Booth came in fourth with 516¼ points; Grant arrived fifth with 516 points; Cadillac obtained sixth place with 502; Cole ran seventh with 501; Buick seven-passenger eighth with 499½; Ford received ninth with 486 points; and the Auburn received tenth with 477¾ points.

The run was made under rules established to suit the conditions. Those cars arriving ahead of schedule time were credited with one point for each minute under the period allowed, which accounts for many of the cars having more than the five hundred points allowed every contestant at the start.

This was the first event held by the Gary Automobile Dealers association which was formed three weeks ago. The second day of the run was given over to several sessions in which a discussion of service, finance, and other questions pertinent to the dealer's welfare, took place. In view of the curtailment of credit which has somewhat affected the dealers of the Steel City, there is a possibility that this organization will form its own finance and bonding company which if consummated will assure the dealer of ample funds without reliance upon outside sources.

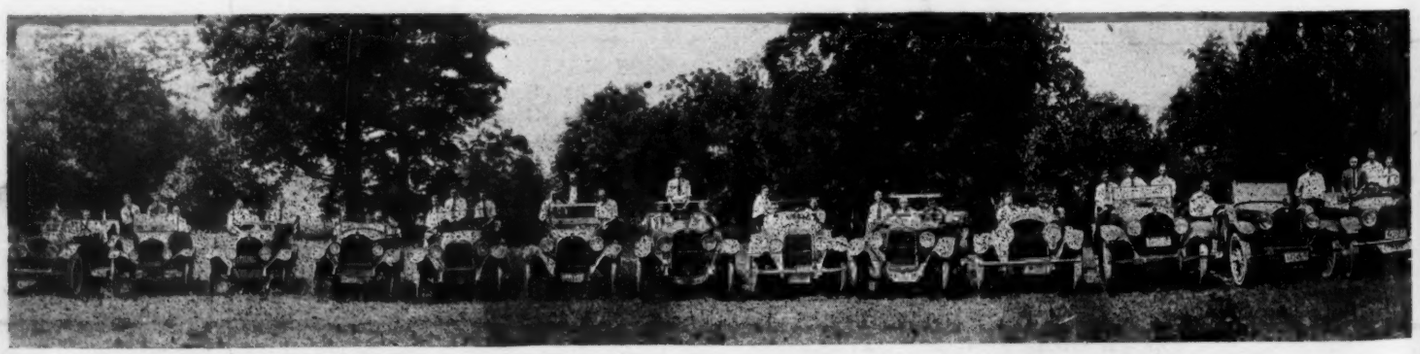


The dealers of the Steel City, who have lately banded together forming the Gary Automobile Dealers Association

ALABAMA DEALERS CONVENE

Mobile, Ala., July 26—Three hundred Alabama automobile dealers will open the eleventh semi-annual meeting of Alabama Automobile Dealer's association here to-morrow. The convention lasts two days, there being three business sessions on Monday, with Tuesday being given over to sports and recreation. Mayor Harry Pillans will welcome the dealers. W. K. Smathers, president, Georgia Automobile association and G. D. Gray, president, Louisiana-Mississippi Trade association, will adress the dealers.

Monday's program also includes a talk on automobile financing by James Fortner, New Orleans, W. S. Keller, state highway engineer, will discuss the good roads movement. Advise on Dealer Advertising is the subject of a paper by J. O. Munn, of Toledo. B. M. Ikert, editor MOTOR AGE, will discuss Better Merchandising and Harry G. Moock, secretary, National Automobile Dealers association, will deliver a message to those who expect to remain in business. A banquet will be held Monday evening and



Line-up of cars participating in realiability run staged by Gary dealers. The run was held from Gary, Ind., to the Shades. The

the following topics will be discussed: The Dealer's Overhead, Credit, Service Time Sales, and The Value of Equipment.

The Alabama Motor Car association is the oldest of its kind in the south and sixty-five per cent of the 1915 members are still in the organization. The efforts of the organization are now devoted to broadening the scope of their work and to improvement of trade conditions as a whole.

AERIAL TRANSPORT PLANNED

Kansas City, Mo., July 26—By the first of October the first scheduled commercial dirigible airship traffic in America will be initiated between Kansas City, Mo., and Tulsa, Okla. The trip will be made in about three hours operating at a speed of 40 to 75 miles per hour and the ships will carry from one hundred to two hundred passengers, according to Leonard J. Lewis, secretary of the Commercial Airship Syndicate, Inc., of Kansas City. The corporation is now financing the building of ships and hangars for the transportation of passengers, baggage and express over eight proposed air routes touching fifty of the largest cities in the country.

The rate per mile will probably be five cents. It is estimated by officials of the company that one fifty-passenger ship traveling 900 miles per day will bring in $2,250.00 each day of operation.

Attention is called to the fact that operating in the higher altitudes with perishable freight will lessen the expense of refrigeration. It is the intention of the operators to load the freighters in California and carry freight to the Eastern states without stopping.

NO LIABILITY INSURANCE HERE

Rockford, July 26—Thomas J. Fay, Rockford, Illinois, owner of the Fay Motor Bus and Truck Company, won his fight with the city council, in which it was proposed to force his company to carry $10,000 liability insurance. Mr. Fay offered to deposit each day, $1 for each bus or truck operated and, out of this fund, pay all claims for liability proven. Fay claimed that the liability insurance plan was unfair as the street railway company and other competing lines were not required to carry such a burden of expense.

More Favorable Theft Insurance on Motor Truck Transportation

DETROIT, July 26—Insurance policies covering freight shipments by motor truck will be issued by an old line company in the future under more favorable conditions than have prevailed in the past, according to E. M. Gunsaulus of the Firestone Ship by Truck organization. Protection equal to that afforded railway and express shipments will be given in Short Haul Motor Transportation, he said.

Although it has been possible in the past for truck operators to obtain insurance covering fire and collision, it has been virtually impossible to secure protection against theft and pilfering. Rates have been almost prohibitive and many restrictions imposed made such policies valueless. Insurance companies were compelled to exert extreme caution on account of the unorganized state of the motor transportation industry. The new plan assures full protection on truck cargoes for operators whose business methods are such as to entitle them to a place on a certified list. The plan also provides for expert assistance in installing cost systems in the offices of operators and for frequent and thorough inspection of the trucks.

The bill of lading carries a blanket insurance clause covering fire, collision, upset, theft and pilfering. The usual personal and legal liability clause also will be inserted in the new plan according to Gunsaulus.

A BACKFIRE

Weymouth, July 28—A curious instance of turning the tables on a complainant took place here when a driver of an automobile complaining to Traffic Officer Robert L. Burbank of alleged widespread violation of automobile license rules, was himself told to attend court to-morrow morning to answer a charge of the same character.

The man drove up to the traffic officer on the street and declared that many automobiles are carrying passengers to and from their work daily without a license and in defiance of the town ordinance and the jitney act.

"Who are the offenders? I don't know them—give me their names," said the officer.

"You're a great officer," said the man. "It is your business to find out who they are."

"Well," said the officer, "as it is my duty to look up things, I think I'll look you up. You are driving an automobile. Let's see your license and registration papers."

The man rummaged through his pockets, but finally had to confess that he was without the desired papers.

"Since you're such a stickler in regard to the observance of town ordinances," said the officer, "I direct you to come to court to-morrow morning and explain why you are operating a machine without your license or registration papers."

PLAN INTER-CITY TRUCK ROUTE

Kankakee, Ill., July 26—Benjamin Hyman has organized a motor truck shipping company at Kankakee, Illinois, and will operate a fleet of heavy trucks for express and freight between that city and Chicago, Danville, Watseka and various intermediate towns of northeastern Illinois. The company will specialize in milk shipments to Chicago. The probability of the completion of the Dixie Highway pavement between Chicago and Danville this fall, is responsible for the formation of this company and it is proposed to operate trucks on a regular schedule, all the way between the two cities. Test trips to determine the time consumed, expense of operation,, etc. are now being made in order to work out a time-table and tariff sheet. The company is now in the market for trucks and will place a large order shortly. It is hoped to have the daily service in full operation by Sept. 1.

Essex car completed the first half of the race in the shortest time, but the Buick five-passenger obtained the highest number of points.

Company to Be Formed to Build Buses and Study Field

Will Be Devoted to Developing Bus Transportation and Providing Buyers With Data

NEW YORK, July 27—Interests closely affiliated with the Bethlehem Motors Corp., Allentown, Pa., are preparing for the formation of a company which will be devoted to fostering the use of motor buses throughout the country. Details of the organization and its scope have not been worked out but an announcement concerning them are expected soon. It is probable the new corporation will be a subsidiary to Bethlehem Motors to all intents.

It is expected a plant will be acquired or erected for the building of bus bodies when the company gets fully under way. Production of buses already has been begun by the Bethlehem company on a small scale and its present factory facilities are being used for this purpose. The additional work has been made possible by enlargements to the plant, although the production of trucks has been increased.

Engineers are working on the design of the bus bodies and every effort will be made to produce vehicles which will be well adapted to passenger transportation under all conditions. A new chassis vehicle is said to embody several new features is being designed.

Not only will the company turn out buses but it will co-operate actively in their operation. Experts will study the different fields and will provide accurate cost statements so that purchasers will not begin their operations by guess but will have cold facts upon which to base their transportation.

Field representatives already have been sent out to look over the situation. They will map out bus lines in cities and in rural districts and the vehicles will be sold either singly or in fleets.

SHERIDAN READY BY AUG. 1

Muncie, Ind., July 28—The General Motor Corp., this city, expects to bring out the new Sheridan car by August 1. Production of 300 cars is expected by January 1. The line will consist of a four cylinder model, listing at $1500 and an eight cylinder model listing at $3000.

MOBILE TRACTOR READY SOON

Atlanta, Ga., July 24—Announcement has been made that the first unit of the Mobile Tractor Company's big plant at Mobile, Ala., has been completed, and that manufacturing operations will start there in the very near future. The company will make a tractor known as the "Mobile," which is a one-man affair. Some idea of the size of the new plant can be formed by the size of the first unit which is 306 by 78 ft. At the outset about 300 men will be employed and the plant will operate night and day shifts. Officials announce that orders already received for the new tractor exceed $2,000,000 for the first year's operations. Work of constructing the other units of the plant is to start immediately. The officers of the Mobile Tractor Company are: Frank J. Ryan, president; A. L. Herbert, vice-president and secretary; C. R. Camp, treasurer; Walter S. Gaines, vice president and chief of the engineering department; George W. Adams, advertising manager.

MONROE PRODUCTION CONTINUES

Indianapolis, July 23—At a recent conference between creditors and officials of the Wm. Small Mfg. Co. of this city, manufacturers of the Monroe car, satisfactory arrangements were made for continuance of production.

William Small, president of the company, says their difficulty has been shortage of material, particularly of bodies. This trouble is now being overcome, according to facts substantiated by officials of the Indianapolis Automobile Trade association. The plant was running full force to-day.

OHIO TRACTOR A NEWCOMER

Columbus, O., July 27—Following a complete organization of the Ohio Tractor Co., into the Columbus Tractor Co., a new $500,000 corporation, the announcement is made that a new four-wheeled farm tractor is soon to be put on the market. The tractor will be called "Ohio". The Ohio is the joint design of B. C. Zuhars and H. D. Clarke, both of whom have been working on the tractor since the discontinuance of the manufacture of the "Farmer Boy".

Exhaustive tests have been made on the farm of the Ohio State University with success in every particular, according to W. F. Garret, treasurer and general manager of the company. It is equipped with a heavy Wisconsin engine and the parts are practically all standardized. A patented double-reduction rear system is pointed to as the feature of the new tractor.

IS THE BUCKBOARD A CAR?

Milwaukee, Wis., July 26—Bicycles with motor-wheels, and the buckboard propelled by motor wheels, are being classed as motorcycles and motor vehicles, respectively, by the Milwaukee police department, with a result that complications are arising. In the case of the buckboard, which has become a popular conveyance among the children of the well-to-do, this enforcement of the state motor code means that children under 16 years are not permitted to drive them unless accompanied by a parent or guardian. The buckboard, under this application of the law, is required to carry a regular passenger car license, costing $10 per annum. Bicycles with motor wheels, classed as motorcycles, are subject to an annual license fee of $4. The motor wheel is distinctively a Milwaukee product and protest is being raised at the action of the police, which is seriously affecting the market for the device.

General Motors Proposes to Build Factories in England

Also Rumored to Become Affiliated With American Dunlap Tire Company of Buffalo

NEW YORK, July 27—Intimate association between the General Motors Corp. and the American Dunlap Co., which is now completing a huge tire factory at Buffalo, has been brought about through the recent purchase by Explosives Trades, Ltd., of London, of $25,000,000 worth of General Motors stock. Close business relationships had previously been established between Explosives, Ltd., and the duPont Industries Co. of America, which controls the duPonts 27% stock holdings in General Motors.

After the armistice, Explosives, Ltd., decided to enter the transportation field. Its first step was to acquire substantial holdings in the Dunlap Rubber Co. of England, the leading tire company in that country. This was followed by the purchase of large holdings in the Tire Investment Trust Co. which controls the Dunlap Rubber Goods Co. of Canada and the Dunlap Far East. The logical development was acquisition of a big interest in the American Dunlap Co., which expects to get into production in a few months.

Impressed With Methods Here

Other companies in the automotive field in which Explosives, Ltd., has large holdings include John Marston, Ltd., of Wolverhampton, makers of Sunbeam bicycles and motorcycles, the Rotax Motor Accessories Co. of London, Kynoch, Ltd., manufacturers of bicycles and motorcycles, and the British Pluviusin Co., of Manchester, which makes artificial leather used in the upholstering of automobile bodies. Its General Motors holdings constitute only about 2½% of the total capital of the American company but it is sufficient to establish close connections between them.

It is intimated that when the directorate of the American Dunlap Co. is announced it will be found to be more or less interlocking with that of General Motors.

Sir Harry McGowan, managing director of Explosives, Ltd., after a personal investigation of the General Motors factories, was deeply impressed with their quantity production methods and is firmly convinced that they can be adopted in England on a somewhat modified scale. It is an open secret that General Motors proposes eventually to enter the British field with factories in England which will be the center for the development of the industry in that country and which will be modeled after those now in operation in this country. When this time comes, its alliance with Explosives, Ltd., will put it in much the same position in England that it now occupies in this country.

Elgin Race Again Set to Be Run on August 21

Changed to First Date Because of Lack of Time for Drivers to Prepare Mounts

CHICAGO, July 27—An all-star cast has been assured for the eighth annual Elgin road race, which will be held Saturday, August 21, on the 8.5-mile course, 38 miles west of Chicago—and the entry list does not close for a period of three weeks.

Originally the date for the Elgin was set for August 21; then it was changed to August 14 to give the drivers more time to reach the Uniontown speedway for Labor Day. But it was found that many of the drivers could not be ready for August 14 and so the date was again changed, back to August 21. In case of a postponement because of rain, the race will be held August 28 and a special train will be waiting to take the racing outfit through to Uniontown in 36 hours. There is little likelihood of a postponement, however, as rain seldom falls at Elgin at that time of the year.

DePalma and Chevrolet Entered

Ralph DePalma has nominated his Ballot, the Duesenberg team will be represented by Tom Milton, Jimmy Murphy and Eddie O'Donnel, Louis Chevrolet has already entered one of his Frontenacs and has assigned his brother Gaston, winner of the 500-mile race at Indianapolis, as the driver.

Cliff Durant has shipped his Chevrolet chassis from the Pacific coast and will have a new engine installed in Chicago.

DePalma passed through Chicago a few days ago from Los Angeles on his way to Detroit to put his French car in shape for the road race and assured the officials of the Elgin event that Eddie Hearne is at Los Angeles preparing his ReVere racing machine for Elgin. The Meteor company through W. D. Morton has written that he will ship the Meteor car with the Duesenbergs.

Expect Prize for Each Lap

Joe Boyer has gone east to arrange to be at the wheel of the 183-inch Peugeot which Ray Howard drove at Indianapolis; Ralph Mulford has always driven at Elgin; there are half a dozen other stars yet to hear from, so that a starting field of fifteen is looked for, with the cream of American drivers competing for the $15,000 set aside as prize and guaranty money. In addition there is a probability that there will be a $100 prize for the leader at the end of each lap. It is proposed by the Chicago Motor club and the Elgin Automobile Road Race association, the joint promoters of the race, to have thirty individual $100 subscriptions to be assigned each for a lap, giving the donor credit for a particular lap and posting the result on a bulletin board in front of the grandstand.

Work on the highway is keeping the road in shape and making it smoother each day; in fact, it is better today than it ever has been during an Elgin race.

Chicago Motor club road scout cars will blaze every road into Elgin for a distance of a hundred miles or more with arrows pointing the way to the race, so that motorists will have no trouble in finding their way to the race.

This year's Elgin is a classic, and so termed by Chairman Kennerdell of the contest board of the American Automobile association; as a result it has been made a championship event in the association's 1920 series and will figure largely in the result of the season's driving, having been assigned a large number of championship points by Mr. Kennerdell.

UNIONTOWN SPEEDWAY IMPROVED

Uniontown, Pa., July 27—Announcement was made today by Manager A. E. Corns of the Uniontown Speedway that the Autumn Classic here on Labor Day, Sept. 6, would be another 200-lap, 225-mile automobile race; practically a duplication of the June 19 racing card. Purses will aggregate $25,000 and a large field of starters has been promised. Approximately $40,000 is to be expended in resurfacing the big wooden saucer. The new surface to be laid for the Autumn classic, combined with the new surface laid for the June race, will mean virtually a new surface and will put the track in better shape than since the opening contests at Uniontown.

Entry blanks will go to the drivers within the next few days.

FAVOR DRASTIC ANTI-THEFT LAW

Columbus, O., July 27—The Ohio State Automobile Association is on record as favoring a more drastic anti-theft law in Ohio and steps have been taken by the officers and board of directors to bring this matter to the coming session of the Ohio General Assembly, which meets after the first of the year. The plan is to get rid of the automobile thief and a drastic law will be drafted by the attorneys of the association.

USEFUL TRAFFIC COPS

The police have unearthed the latest method of illegal liquor selling at a Massachusetts summer resort and believe that the promoters have made a clean-up from thirsty visitors.

Last week, "souvenir traffic cops" appeared on the beach for sale. They are six inches high with a hand raised for a signal. Under the armpit is a little cork. When said cork is withdrawn, the purchaser can secure two drinks of moonshine, as it is the "traffic cop's" capacity. The packages have retailed for $1.50 and "moonshine" was used in filling the interiors.

Uncover Vast Car-Theft Plot to Rob Dealers and Garages

Forged Certificates of Ownership Produced When Offering Stolen Cars for Sale

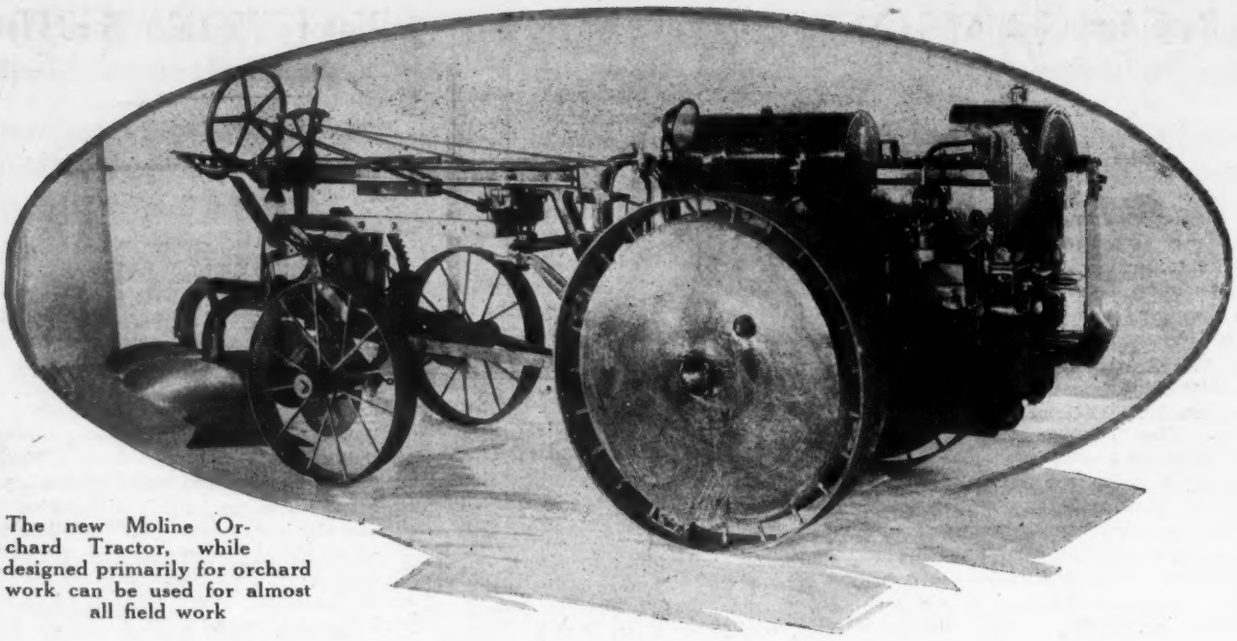
WASHINGTON, July 29—Discovery of a gigantic plot to swindle automobile dealers and garage owners of the country by sales of stolen automobiles has aroused widespread interest in what is regarded as the first real test of the recently enacted Dyer Law. Washington and New York detectives uncovered thefts which are valued at $500,000 in tracing down the sale of high-priced cars to dealers in this vicinity at ridiculously low prices. Automobile dealers along the Atlantic coast, particularly in New York, Baltimore, Newark and Philadelphia, have been summoned to testify before the grand jury.

The police seized seven certified drafts for $1750 each from Albert McIlveen, automobile dealer of this city. These drafts will be used as evidence against parties taken in the police round-up now under way. Because of the developments in this case, local dealers, especially the garage owners, have been inconvenienced of late by the actions of detectives in examining all cars and parts.

Secret Numbers Aid Police

The police say that the secret number placed in the late models by manufacturers has proved of inestimable value in the determination of the rightful owner. It is quite evident that the thieves employed skillful mechanics to obliterate all identification marks which the owners or the manufacturers had placed on the automobiles. It is for this reason that the authorities are giving special attention to the examination of used parts in garage storerooms. Within a week, thirty-five automobiles which were reported stolen in New York have been restored to their owners. The police say that the Ford sedans of the 1919 and 1920 models were the ruling favorites in automobile thefts.

Dealers throughout the district anticipate expensive legal proceedings over the ownership of the cars. Judging from the police reports the organized thieves adopted clever methods to allay the dealers and garage owners suspicions as to ownership whenever these cars were offered for sale. Certificates of ownership and bills of sale were quickly produced at the time the car was delivered. This paper afterward proved to be forgeries. The fact that the dealers have these alleged bills of sale on hand, is expected to be a source of legal proceedings. Dealers here who have been swindled told the police that the cars were purchased from Morris Elias, proprietor of the Lincoln Auto Exchange of Newark. Elias is now out on $10,000 bail to appear before the grand jury here August 20, to answer a charge of violating the Dyer Act.



The new Moline Orchard Tractor, while designed primarily for orchard work can be used for almost all field work

MOLINE ORCHARD TRACTOR BUILT LOW

Same Constructon as Moline-Unive rsal But Nearly Twelve Inches Lower. Drawbar Pull 9 Hp. and Can Turn With Implement in 16 Ft. Circle

THE new Moline Orchard Tractor, a two-plow job, is built primarily for orchard work but can be used for all field work, the same as the Moline-Universal Tractor, except for the cultivation of tall row-crops.

Its construction is similar to that of regular Moline-Universal but lower, so that it can work under low hanging branches without damage to the trees. The top of its radiator is 55¼ in. from the ground. This is nearly a foot lower than the regular Moline-Universal and, of course, makes it more adaptable to orchard work. The wheels contribute to its lower construction, being 44 in. in diam. instead of 52 in. Its clearance is 18 in., instead of 29½ in.

Features of Construction

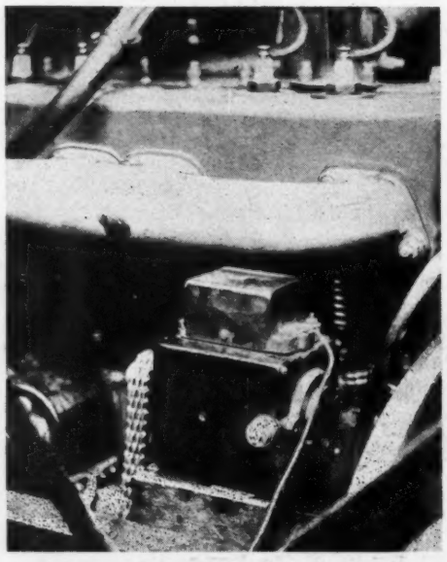
The features of two-wheel construction which are light weight, close couple to the implement, one man operates both tractor and implement from the seat of the implement and it is claimed 96 per cent of tractor weight is traction weight. It weighs 3380 lbs. and can turn with its implement in a 16-ft. circle. For belt work a 9-in. belt pulley with 6½-in. face, which will deliver 18 hp. is provided. The drawbar pull is 9 hp. and the tractor speed is from ½ to 3 miles per hour.

The engine is a four-cylinder overhead valve type, 3½ in. bore and 5 in. stroke. The carbureter used is a Holley automatic, and a Bennett cleaner to remove dust from the air is also provided. The gasoline capacity is 15 gal. The lubrication is full force feed and the cooling system, thermo-syphon. The electrical equipment used is the Remy system and includes the Remy electrical governor and a storage battery spring mounted. Starting is accomplished through Bendix drive. The clutch is a Borg and Beck, three plate dry disk and the transmission has one gear ratio forward and one reverse. Cut and hardened nickel-steel drive pinion slides on splined clutch shaft and the driving disk in clutch fits in splines in clutch shafting.

Power is transmitted to differential shaft by bevel gears and the differential which is of the bevel type, self contained, is provided with a differential lock on the shaft. This makes both wheels turn together and is of great value in soft ground.

The final drive is through bull gears of the internal type within dust-proof housings. The control is so arranged as to be accessible from the seat of the implement, with all central levers within easy reach of the operator, including the self-starter.

NICOLITE ELECTRIC LIGHTS FOR TRUCKS AND TRACTORS



Showing the Nicolite installation on a Packard truck

The Nicolite is a new electric lighting system that does not require a storage battery. The first consideration in building a successful low tension generator for this purpose is to make it strong enough to stand up under hard use. The second is to control the flow of electricity, so as to give steady lights without the use of a storage battery. This generator is rugged and fool-proof. The armature shaft is mounted on high grade annular ball bearings, and the entire mechanism is enclosed in a heavy iron case to keep out all dirt, oil or water. The automatic controller is mounted on top of the generator, making a compact unit, requiring very little space. This controller holds the flow of electricity steady, regardless of engine speed. The Nicolite system will deliver six volts and eight amperes at 1800 r. p. m. The installation should give this speed at low engine speed and any increase is controlled by the automatic regulator.

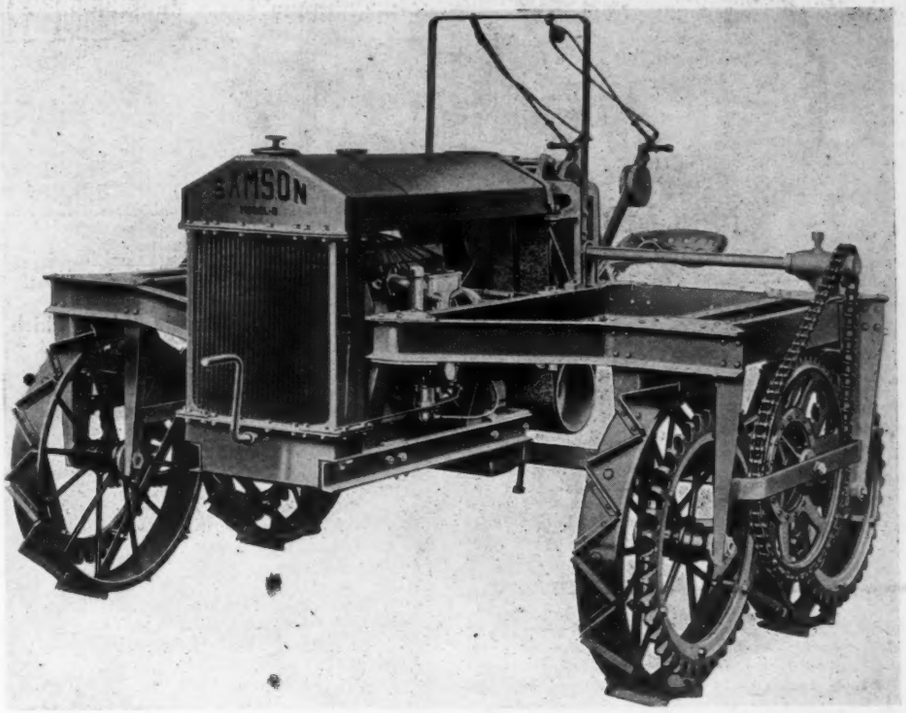
NEW SAMSON IRON HORSE TRACTOR $630

Is of the Short-Turn Four Wheel Type. . Operator Drives With Lines Similar to Handling a Team of Horses

THE new Samson Tractor, Model "D," which will be known as the "Samson Iron Horse" is a short-turn, four wheel drive tractor which it is claimed will do the work of three horses, in addition to belt power jobs about the farm. According to the announcement just being made, it will sell for $630 f.o.b. Janesville, Wisconsin.

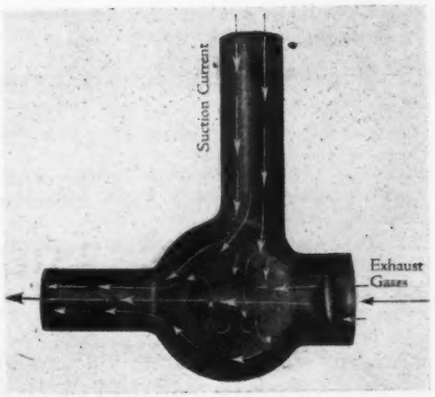
The Iron Horse drives with lines—like a team. The operator is thus able to handle both the tractor and an additional implement or vehicle.

From the belt pulley it supplies power for grinding, shelling, sawing wood, running the cider mill, portable sprayer, etc. In draw-bar work, it will handle a two or three horse grain drill, a single disk, a harrow, a mower, a corn planter, a two-row cultivator, a bean and sugar beet cultivator, a corn binder, a three horse plow, a hay rake or tedder, a wagon with a hay loader, a road drag, scraper or grader. Special attachments are provided which can be used when a new cultivator, corn planter, or mover is needed and can be purchased from the company at a considerably less cost than a new implement.

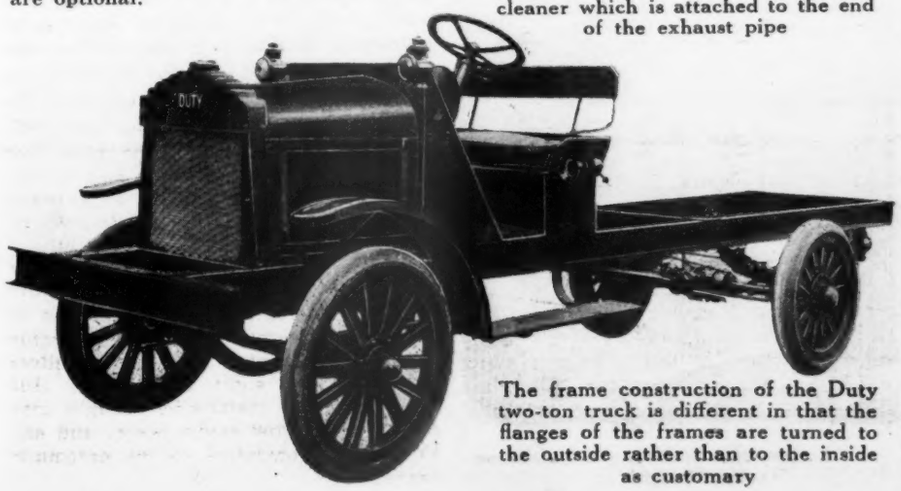


New Duty Two-Ton Truck

The Duty truck is a two-ton job listing at $1695, F. O. B. Greenville, Ill. It has a standard four-cylinder engine for power plant, uses a multiple disk clutch, and a three speed transmission, these units being combined into a unit. An internal gear axle is employed on the rear end, and solid tires are used. The truck weighs 3350 lbs. Its wheelbase is 134 in., tread standard and road clearance 12 in. Semi-elliptic springs are used throughout. The frame construction is very peculiar in that the flanges of the frame are turned to the outside rather than to the inside as is customary. The front bumper is a very rigid member, being of the same section as the frame and riveted in place solidly. Pneumatics are optional.



View showing passage of the exhaust gases through the La France vacuum cleaner which is attached to the end of the exhaust pipe



The frame construction of the Duty two-ton truck is different in that the flanges of the frames are turned to the outside rather than to the inside as customary

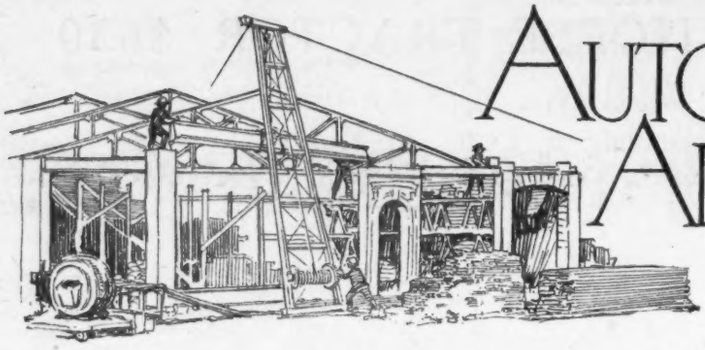
The La France Detachable Vacuum Cleaner

The La France detachable vacuum cleaner is an instrument which utilizes the exhaust gases in producing a vacuum for cleaning purposes. It is claimed that this device will create a suction three times as strong as the electric cleaners used in homes. It is simply a new adaption of an old principle and will enable a motorist to clean the top sides, floor mats, cushions, etc., in a very short time and at an almost negligible cost.

The equipment consists of the vacuum bowl, rubber hose and two attachments; the open nozzle is used for floor boards, floor mats and heavy dirt; the brush is used for upholstery, for removing dust and dirt that accumulates on hats and clothes while motoring and while making tire changes or other adjustments.

The cost of operation is very silght as it is only necessary to run the engine about 500 or 600 r.p.m. for about five minutes and the job is done. The method of attachment is simple—merely turning a thumb screw fastens the bowl to the end of the exhaust pipe. For cars with exhaust pipes under the chassis, a permanent extension pipe is furnished with the equipment.

A cleaner has been designed for each make of car and the Franklin Products, Inc., 1052 S. Clinton St., Syracuse, N. Y., will furnish the necessary equipment to complete a permanent installation at prices ranging from $8 on the lower priced cars to $16 on the higher priced cars.



AUTOMOTIVE ARCHITECTURE

Planning *and* Building Problems

CONDUCTED BY TOM WILDER

No. 249

BUILDING WHICH CAN BE ENLARGED

We are planning to put up, either a two or four-story building with basement on a corner lot, 99 by 135 ft. in size. There is a rise of three feet from the front of the lot to the rear. We would prefer to have the salesroom floor in the front of the building as near level with the sidewalk as possible, the entrance would be on the side in one and one-half foot elevation. With this later arrangement, the entrance would be on the side in about the center of the building and the main floor would be dropped about one and one-half feet at the rear.

On the main floor we want a salesroom with a tile floor, large enough to display five touring cars and one truck; a large general office, with cashier booth convenient to the accessory, tire and parts department; two private offices; an office for an automobile finance concern with an outside entrance; a ladies' rest room and a stockroom with a dumb waiter. Also, we will need space for cars used in demonstrating and service space for cars requiring minor repair work. The battery shop is to be at the rear of the building.

The repair shop will employ from ten to fifteen men, and will be equipped with modern machinery. The used car department will have to be large enough to accommodate twenty cars. It must be handy to the elevator. It will be necessary to have storage space for almost 100 new cars. Also, we may decide to install an up-to-date paint shop.

The basement is to be used for storing cars, the heating plant and tire press. If you draw plans for two stories and basement we would want it so arranged that two stories could be added later on.—Snow Automobile Co., Ottumwa, Ia.

Your showroom should be on the street level. The view a person gets from without is very much better if the floor is level with the sidewalk than when raised even one step. We should not consider raising the floor level and we find that there are two ways of getting around the existing conditions. One, which we illustrate, is by using an incline which would be only six per cent and hardly enough to be noticeable. The other way would be making a floor with two levels, the front section on one level and the rear section eighteen inches higher with a few steps between. We prefer the former plan however, as an outside car entrance to the showroom would be necessary in the latter case; also, the basement would have two ceiling heights, though this would not be serious, inasmuch as it is to be used for storage only.

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and readers are urged in asking for such plans to be used to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

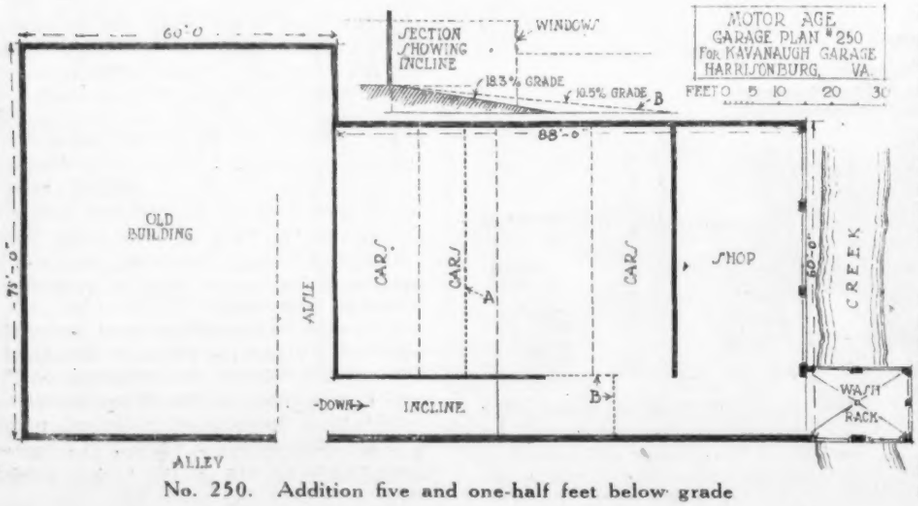
The increased cost of a full basement as compared with two-thirds the area would be so slight that it is not worth considering. It will be impossible to get much light into this basement however, except by the use of areas or prism sidewalk lights. Aside from economy in heating, the basement has absolutely nothing to recommend it for garage or or service station use and we would rather see you build a third story, where you would have plenty of light and air. Of course, if you have to go down to get a good foundation, that alters the situation and you may as well take advantage of the fact. Then there is the possibility of your neighbor excavating later and undermining your walks, unless they are on deep foundations.

We have been unable to find a location for the elevator on the outside wall where it would not cut into the frontage in such a way as to be undesirable. Everything considered, the location it has on the plan is the best. The only practical outside location would be at A.

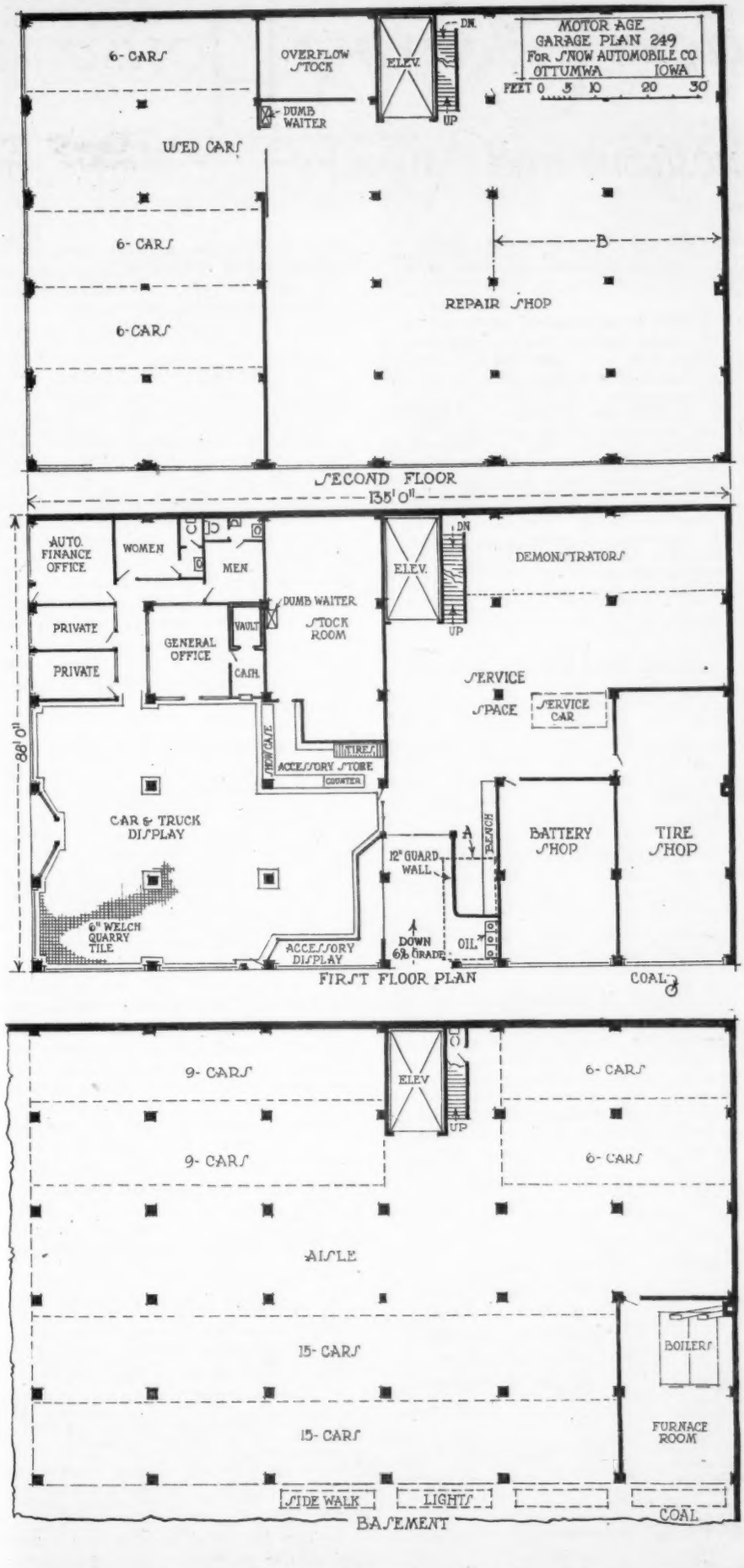
Reserving space for twenty used cars cuts into the light space of the second floor severely and it might be better to use the space B across the back of the building instead. This would be especially advisable if you decide to have a paint shop. Good artificial lighting or temporary skylights would furnish the light necessary to display the cars.

We think your tire press should be in the tire repair shop, rather than the basement. There should be plenty of room for it there but if for any special reason this location would not be satisfactory then put it in the repair shop.

There would be no difficulty adding more floors to this building without even interrupting business but if this is contemplated it would be best to construct the third floor in place of a roof with a temporary roof structure to shed the water. This would cost a little more but would save leaving the upper floor exposed while building operations were going on.



No. 250. Addition five and one-half feet below grade



No. 249—Building with provision for enlargement

No. 250

ADDITION FIVE AND ONE-HALF FEET BELOW GRADE

We are building an addition to our present garage and while we appreciate the fact that this addition is probably not being built in the best shape for a garage, this cannot be helped, due to limited space. The new building is to take care of a new shop and at the same time add to storage space.

The rear of the new building will extend over a creek and give room for a wash rack. The water will be pumped from creek to storage tank on top of building for washing, etc. Four men will be employed in the shop. Storage space for 50 to 75 cars is desired. Also, it will be necessary to have an inclined drive for the exit of storage cars.—Kavanaugh Garage, Harrisonburg, Va.

The location you have indicated on your sketch is a good one and we have incorporated it in our plan. There is, however, another location which has the advantage of giving a better incline to the new part. It is indicated between the back of the old building and the line A and should be built up to the old floor level so that it could be entered from the aisle at the back of the old building. The elevation would also allow windows above the roof of the new building, as indicated roughly in the section sketch.

In either case, the cars should be stored across the floor and arranged in rows. Two rows can be placed on one side of the cross aisle and one row on the other side, the space allowing for a maximum of twenty-one cars to be stored.

The straight aisle gives a good approach to the incline. It will save many drivers from stalling their engines and prevent possible accidents resulting from cars coming down out of control.

Don't you think it would be advisable to build the floor up on concrete piers? If you lay a cement floor, you will use nearly the same amount of material as you would for a reinforced concrete job. The piers can be placed close together, so that the reinforcing rods would be small. Also, old or used lumber could be employed for the forms, as the appearance of the underside would make no difference. By placing your piers 10 ft. apart each way, no beams would be necessary, only a slab 6 in. thick, well reinforced with rods at the points where it rests on the piers and with diamond mesh or other reinforcing material continuous over the entire slab.

RED DIAMOND MOTORS BUILDING

Atlanta, Ga., July 26—Red Diamond Motors, the new $5,000,000 automobile and motors corporation recently organized in Atlanta, will shortly begin the construction work on the first unit of its automobile works. This building, which will be of steel and concrete, will cost about $250,000. A foundry and machine shop will be constructed later, the company having acquired a twenty-one acre site for its plant. The officers of the corporation have been named as follows: W. H. Seabrooke, president; Henry Short, secretary; R. E. Hicks, vice president, and T. L. Hamilton, treasurer.

The Readers' Clearing House

Questions and Answers

CONDUCTED BY ROY E. BERG

Technical Editor, Motor Age

THIS Department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

MEASURING TANK CONTENTS

Q—Publish formula for figuring the contents of cylindrical tanks lying horizontally. I wish to figure the contents of oil in cylindrical tanks buried under the ground by using a stick or gage for getting the height of the liquid in the tank.—C. D. Blackwelder, Madras, India.

In a cylindrical tank lying horizontally the contents cannot be measured without the knowledge of certain geometrical relations existing between the height at which the liquid stands and the volume it occupies. These are given in Fig. 1 and 2; first in relation of volume to height; second, in relation of height to volume. Fig. 1 shows two curves from which it is possible to determine the capacity of the tank from its dimensions and also enables you to lay out a stick to measure the contents of the tank while in the horizintal position. Take for example a tank 12 in. in diameter by 40 in. long. The ordinate corresponding to 12 intersects the 2 Curve of Gallons per Inch of Length at .49 in. Multiplying this by 40 we get 19.6 gallons for the tank capacity. Now to find the distance above the bottom of the stick in inches for any number of gallons, assume that the above mentioned tank contains three gallons. The decimal proportion of the total volume occupied by three gallons equals three divided by 19.6 or .153. Take a look at the curve. The ordinate corresponding to this value which is found on the scale marked Parts of Volume, intersects the — Curve of Depth Factor at .213. Multiply this by twelve, the total depth or diameter of the tank, we have 2.556 or approximately $2\frac{9}{16}$ inches above the bottom. In this manner, assuming any number of gallons in the tank, calculations can be made and with the assistance of the curve the proper distances to be marked on the stick corresponding to each gallon can be obtained.

Miscellaneous

MIXING ETHER AND GAS

Q—Is it feasible to mix ether and gasoline for engine purposes?

2—Will the combination result in injury to the engine, etc.?

3—Is it possible to mix Picric acid with low grade gasoline and get satisfactory results without injury to the engine?—H. H. Derr, Sacramento, Calif.

1-2-3—It is not feasible to mix any solution such as ether or picric acid with gasoline because it will injure the engine in time. It is like the drug habit and in a short period of time will ruin the engine entirely. The only logical way is to accept the fuel as it is and provide a means of handling it properly.

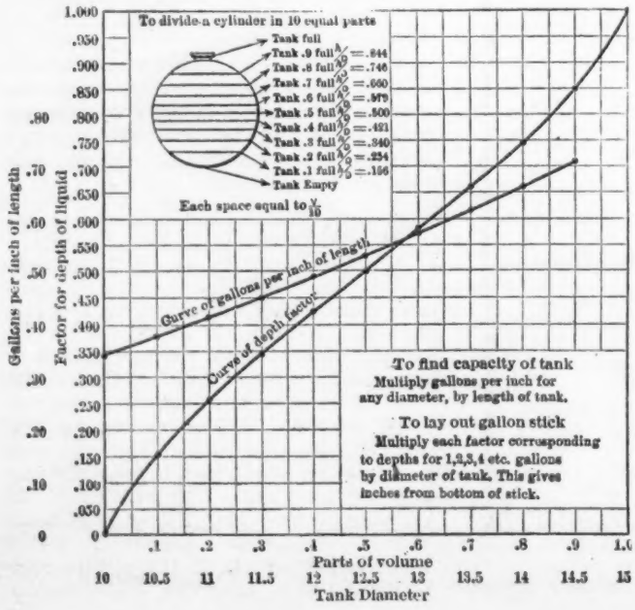

To divide a cylinder in 10 equal parts
Tank full
Tank .9 full A/ =.844
Tank .8 full =.746
Tank .7 full =.660
Tank .6 full =.579
Tank .5 full =.500
Tank .4 full =.421
Tank .3 full =.340
Tank .2 full =.254
Tank .1 full =.166
Tank Empty
Each space equal to 1/10
Curve of gallons per inch of length
Curve of depth factor
To find capacity of tank
Multiply gallons per inch for any diameter, by length of tank.
To lay out gallon stick
Multiply each factor corresponding to depths for 1,2,3,4 etc. gallons by diameter of tank. This gives inches from bottom of stick.
Gallons per inch of length
Factor for depth of liquid
Parts of volume
Tank Diameter

Fig. 1—Curves from which is is possible to determine the capacity of a tank, knowing its dimensions

PLUGGED OIL LEAD

Q—The clutch on a 1919 Chandler roadster gives a lot of trouble on account of the bearing running dry. Plenty of oil is put in the small oil cup which is just behind the handbrake lever and gearshift lever, but the oil does not follow the shaft, which is about 10 or 12 in. long, and keeps the bearing which is on the end of this shaft oiled. This clutch has been disassembled several times and we find that the oil goes only about half the length of the shaft.—Peter DePope, Curly's Garage, Paterson, N. J.

It is very evident that the oil lead is plugged up. We suggest removing the oil lead and applying a little air pressure. If this pipe is clean, there is no reason why the oil should not get down to the bearing.

LENGTHENED WHEELBASE

Q—Have lengthened a Ford 13½ in., making it 113½ in. There is a cut down body on it, gas tank in the rear, vacuum gasoline system, electric lighting system, battery and generator belt driven. Would lengthening it take away power? Do not believe it has the power on hills that it should have. Use a model FS Rayfield carbureter. It rides much easier. Do you advise leaving it as it is or changing it back to standard Ford wheelbase?—S. Gale Abbott, Oakland, Cal.

If you have increased the wheelbase it is only natural that the weight is also greater. In changing the construction the resistance is probably increased and with the additional weight the engine may not pull as well on the hills. The thing to do is to increase the size of the valves, and if you can stand the expense it would be well to install a 16 valve head. The question as to whether you should change back to the wheelbase of the original design is a question that you will have to decide for yourself, as you can tell whether you have gained anything by changing or not.

RAYFIELD FLOAT LEVEL

Q—What is the correct level for the gasoline to show across the glass in the float chamber of a Rayfield carbureter used on a 1919 E 40 Mitchell?

2—What grade of lubricating oil should be used in a 1914 Thor motorcycle that has been converted into a kerosene burner? When run on gasoline it used Mobile BB.

3—Is a 29 by 2¾ in. tire an oversize for 28 by 1½ in. Can both be used on the same rim?—J. Lee Yates, Luther, Mont.

1—The float level is set at the factory and should not require any adjustments, but if it should, then the correct level

should be maintained in the middle of the window in the side of the float chamber.

2—We advise using the same grade of oil but it should be changed at shorter intervals.

3—A 29 by 2¾ in. tire is not the oversize for a 28 by 2½ in. and cannot be used on the same rim as there is ½ in. difference in the inside diameter of the two tires.

NOISY AXLE

Q—The axles on a new series Chandler which has been driven about 4500 miles cannot be made to run quietly. It either sings when driving steady and not when coasting or when coasting only.

2—Would the gears of a Paige, Hudson, Olds, Buick or other car of about the same power fit or could they be made to fit the present housing?—H. S. Howlett, Detroit.

1—We are inclined to believe that the housing is at fault and not the gears. You will have to go over the entire rear axle assembly and make adjustment to see if the noise cannot be eliminated.

2—The axle used on the Chandler is made in their own factory and we do not believe that any of the axles mentioned will be apt to fit the Chandler car. If you desire to install a new axle we advise taking the matter up with some of the axle manufacturers. Addresses may be obtained from the advertising columns.

HUDSON CLUTCH AND GEARSET

Q—What should the compression pressure in pressure pounds be in a Hudson Super Six?

2—Instruct how to remove the transmission and clutch.

3—Instruct how to remedy oil leakage through the holes in which the studs are fastened on which the disks are set.

4—How much should the cork insertions project beyond the face of disks?

5—The tappets have been carefully adjusted to .004 in. but still some give a clear click when pulling them up and down with the fingers while some have only a dull sound. Explain why this exists and how remedied.—Roy Kutschenrenter, Square Deal Auto Repair Shop, San Antonio, Tex.

1—A compression gage that can be screwed into the spark plug hole should register about 70 to 75 lb. when the throttle piston is held wide open so as to give full aperature and the engine is cranked by hand as fast as you can spin it.

2—Removal of the transmission should be carried out as follows: Refer to Fig. 4. Remove the bolts and cap screws on either side, first, leaving the extreme bolt tightened up in position. This supports the entire weight of the transmission and allows no straining of the pilot shaft or the main drive gear. As a last operation, remove the nut from the long bolt at the top and when you have obtained sufficient to insure your being able to withdraw the transmission in a straight line with no bending or crimping whatever, pull it off slowly. Leave the bolt in place to pilot the transmission shaft during removal. To remove the clutch assembly make a lever looped into a wire from the engine foot and bearing against the driving jaws of the clutch. Hold the pressure of this lever until the two cover bolts are removed. This will allow you to remove the entire clutch assembly.

3—The most advisable thing to do is to wind a little wicking around the heads of the studs before screwing them down. The assembling and rendering oil tight of the clutch is greatly facilitated by the driving studs being riveted into the cover. In this way, there are no packed joints in the flywheel except the cover and the screws which secure it.

4—The driving disks, which are secured in the flywheel by the four specially heat-treated studs are stampings, carefully flattened and machined so as to slide freely on the studs. The driven disks are also stampings but are thicker and have numerous holes in them; into these holes the cork inserts are pressed. The corks are first soaked in warm water to make them pliable; then they are forced into the holes by a special machine. A considerable amount of cork is left on either side of the disk and this is shaved off to leave about $\frac{1}{32}$ in. after the corks have thoroughly dried out, then the corks are ground flat on a surface grinder. In making a replacement of corks in the repair shop that is not properly equipped to handle the work, the surfacing of the corks is usually accomplished by rubbing the disks on a piece of sandpaper. The result is seldom satisfactory, as the corks are not flat and even, and do not give the full bearing surface necessary in order to have the friction necessary to hold the power of the engine.

5—This is probably due to the fact that in a certain position of the valve, one tappet may have more clearance at the cam than the other. This condition may result by having only a small variation of valve position while making the tappet adjustment. If proper clearance is allowed, a film of oil will accumulate between the cam and the bottom of the push rod at every revolution of the camshaft. A variation of this oil cushion may make a slight difference in sound. It is not right to take the quietest tappet of the twelve and set up the others to equal it. Endeavor to average the noise as much as possible. The engine may be a little more noisy, but so long as there is a distinct evenness of sound, it is far less objectionable than eleven quiet tappets and one noisy one.

TO HELP readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

MISCELLANEOUS

C. D. Blackwelder.....Madras, India
John S. Nickel.....Jacksonville, Fla.
S. Gale Abbott.....Oakland, Cal.
J. Lee Yates.....Luther, Mont.
H. S. Howlett.....Detroit
Roy Kutschenrenter, Square Deal Auto Repair Shop.....San Antonio, Tex.
E. Johnson.....Kansas City, Mo.

THE POWER PLANT

Harry Carlson.....Marquette, Neb.
Ralph Young.....Eaton, Ohio
Martin A. Waline.....Turlock, Calif.
W. R. Hamilton.....Mason City, Ia.
A Reader.....Knoxville, Tenn.
H. Anderson.....Pine Bluff, Wyo.
Mark L. Putnam.....Richmond, Kans.
Fred F. Kelly.....Topeka, Kans.
Ira Cunningham.....Covington, Okla.
Frank Ellis.....Arvada, Colo.
R. W. Eddy.....Waterloo, Ia.
F. Slater.....S. Kaukanna, Wis.

THE ELECTRIC SYSTEM

R. B. G.....Waterloo, Mont.
Chas. Briggs.....Chicago
George Braun, Campbellsport Auto Sales Co.....Campbellsport, Wis.
Chas. E. Gregory.....Howard, Kans.
Mark L. Putnam.....Richmond, Kans.
C. E. Fields.....San Francisco, Calif.
F. Martels.....Hatchogue, N. Y.
D. V. Russell.....Laona, Wis.
Daniel Moran.....Brownsville, Tex.
C. W. Canady.....San Antonio, Tex.

VELIE TRANSMISSION

Q—Publish illustration of a 1914 4-cylinder Velie transmission.

2—What causes the shifting lever to jump out of gear when the car is pulling?—E. Johnson, Kansas City, Mo.

1—This is shown in Fig. 3. The Velie company used two different transmissions during this year and if this does not suit the case you can obtain the desired information from the Brown-Lipe Gear Co.

2—This is probably caused by the dogs being worn or the shifting fork bent.

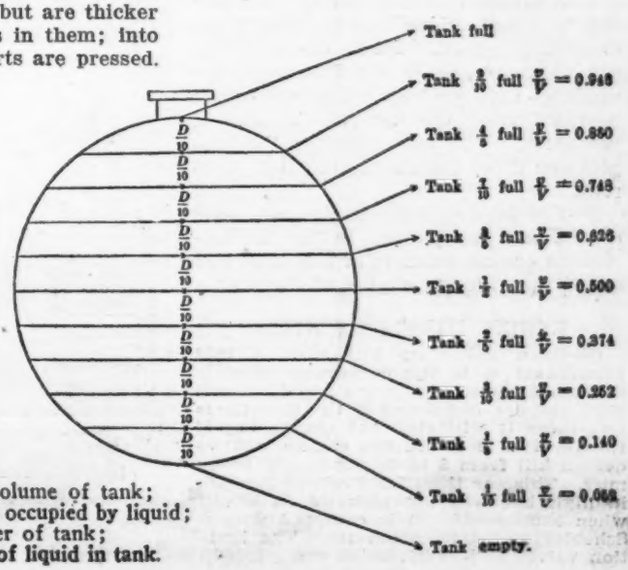

Tank full
Tank $\frac{9}{10}$ full $\frac{v}{V} = 0.948$
Tank $\frac{4}{5}$ full $\frac{v}{V} = 0.880$
Tank $\frac{7}{10}$ full $\frac{v}{V} = 0.748$
Tank $\frac{3}{5}$ full $\frac{v}{V} = 0.626$
Tank $\frac{1}{2}$ full $\frac{v}{V} = 0.500$
Tank $\frac{2}{5}$ full $\frac{v}{V} = 0.374$
Tank $\frac{3}{10}$ full $\frac{v}{V} = 0.252$
Tank $\frac{1}{5}$ full $\frac{v}{V} = 0.140$
Tank $\frac{1}{10}$ full $\frac{v}{V} = 0.052$
Tank empty.
$\frac{D}{10}$

Fig. 2 — Calibration for cross-section of tank giving capacity at various levels

V = total volume of tank;
v = volume occupied by liquid;
D = diameter of tank;
h = height of liquid in tank.

The Power Plant

ANZANI ENGINE

Q—It is my understanding that the Anzani is a fixed cylinder radial engine while the Gnome and LeRhone have rotating cylinders. All are air cooled. Are these engine types very reliable and lasting in hours of service compared with water-cooled airplane engines? Are they apt to overheat? Is the Anzani made in the United States?

2—Illustrate the 7-cylinder Anzani engine and explain the lubricating system used. Does it require castor oil for lubrication?

3—How is the gas admitted into the cylinders?

4—How is the ignition and valves operated?

5—What objection was there to the fixed cylinder radial type, or why did the rotary engines seem to have the preference in warfare? It would seem as though the fixed cylinder radial type would be more simple and also free from the sometimes dangerous gyroscopic action of the rotary engines.—Harry Carlson, Marquette, Neb.

1—The Anzani engine is of the fixed crankcase type and the LeRhone engine is of the fixed crankshaft type with revolving cylinders. Both of these makes of engines are very reliable. As far as service goes they probably are as good as any of the water-cooled engines. About 100 hours service is all that can be expected of an airplane engine when in constant service. It must then be overhauled and these air-cooled jobs hold up very well during the 100 hours service. The Anzani is of foreign origin.

2—A view of an Anzani engine is shown in Fig. 5. This engine which is shown in the illustration is of the six-cylinder type, but the seven cylinder engine which you requested is practically the same, even to the details. Castor oil is generally used exclusively on engines of this type, while a good grade of mineral oil is used on the water-cooled engines.

3—The carbureter and gas passages are shown very clearly in the illustration. The gas goes to the central distributing center first and radiates outward from here through each cylinder's individual connection.

4—A magneto is used for ignition and this is driven at one and one-half times crankshaft speed. Since the cylinders are stationary, leads run directly to the plugs in each cylinder. The valves are operated from the cam at the end of the shaft. The cam operates the tappets and these operate the inclined push-rods.

5—The fixed cylinder engine was used a good deal in warfare. In fact the Salmonson engine which is of this type was called the "Liberty engine of France."

ENGINE MISSES ON HILLS

Q—Upon going up hill with a 1918 Studebaker 6, if the carbureter throttle is opened up to give more speed, it will slow the car down and if the throttle is left there it will stall the engine but if the throttle is closed the engine will go over a hill from 5 to 10 m.p.h. and never miss. This car throttles down to 2 m.p.h. in high but will not pick up on a hill when accelerated. It is equipped with a Schebler model R carbureter. The ignition valves and compression are good, in fact, the engine is in fine shape.—Fred F. Keely, Topeka, Kans.

We believe that the trouble is caused by poor carbureter adjustment or, perhaps, the vacuum system is at fault. The question is, do you wait until you get on the hill and then try to accelerate quickly or do you accelerate gradually. It is very logical to believe that the relation of the air intake to the gasoline intake is not correct and it will require very careful adjustment. The mixture may be alright for high speeds or for slow speeds if there is not rapid acceleration but if the throttle is opened suddenly, the rapid inrush of air will give a mixture that would be entirely satisfactory at a higher speed but is too weak to give good acceleration. It would be advisable to go over the entire gasoline feed system carefully and see that everything is in proper adjustment.

OVERHEATING

Q—A 1917 Hupp "N" overheats in fast driving. It gives no trouble up to 35 or 38 m.p.h. regardless of distance, but if driven at 45 m.p.h. or better for a mile or two, it gets very hot, making the water boil. The timer points have been filed and set according to the A. K. gauge. Timing seems to be O. K.; no surplus of carbon. Water hose in good condition. Stock carbureter.—Ralph Young, Eaton, Ohio.

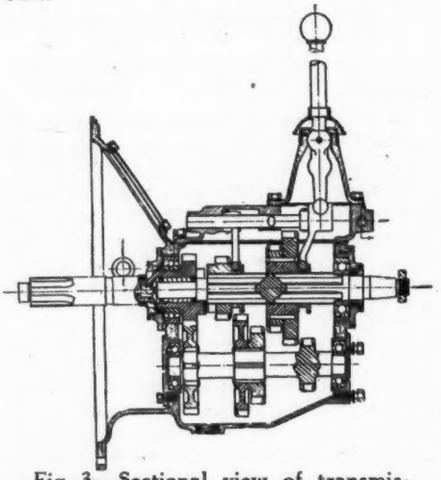


Fig. 3—Sectional view of transmission on a 1914 4-cylinder Velie

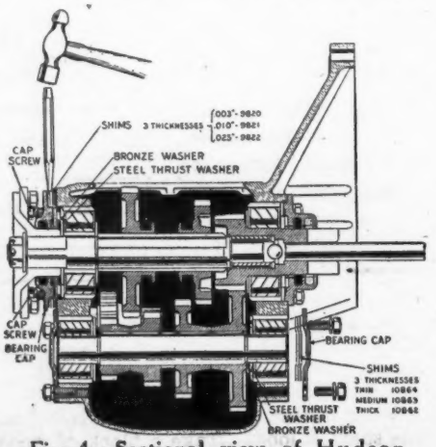


Fig. 4—Sectional view of Hudson Super Six clutch and transmission

How about the mixture? If the mixture is very rich it will result in overheating. Examine the spark and see if the bell crank has not slipped so that you are running with the spark retarded too far at high speeds. This condition, together with a rich mixture, will cause excessive heating. It would be advisable to flush the entire cooling system out so as to be sure that there is no scale preventing the circulation of the water. Don't forget a few of the minor things, such as a tight fan belt.

BEARING OIL GROOVE

Q—Is it necessary to put an oil groove in rear main bearing cap of a Ford engine and if so, why?

2—Instruct how to tighten a loose cam shaft bearing in a 490 Chevrolet. The camshaft is practically new.—Martin A. Waline, Turlock, Calif.

1—The upper cap of the rear main bearing is provided with a groove but the lower cap is not. The upper cap should have an oil groove because the oil is splashed up and enters the bearing through a hole in the upper cap and is distributed along the bearing by the grooves.

2—The Chevrolet uses a tubular type of camshaft bearing and the advisable thing to do is to slip the old one out and put in a new one.

TIMING GEAR HOWL

Q—A howling has developed in the timing gears of a Paige light six, 6-cylinder Rutenbur engine. Would it be possible to lubricate these gears with some heavy oil or possibly graphite and thus quiet them?—W. R. Hamilton, Mason City, Ia.

1—The first question is: "Have the gears been properly lubricated and are they properly lubricated at the present time?" We are inclined to believe that it is a case of worn bearings or badly worn gears. If the bearings are badly worn and the gears seem to be in good shape, it is very probable that the howl can be eliminated by replacing the bearings. If gears are badly worn, it may be necessary to install both new bearings and gears.

COUNTERBALANCING

Q—Would a Ford using counterbalance crankshaft run with less vibration than one without? Would it take the place of light pistons?—A Reader, Knoxville, Tenn.

Without any question the use of a counterbalance will reduce the vibration considerable, providing the balancing has been properly done. It must be remembered that simply buying a counterbalance and hanging it on the crankshaft will not guarantee balance and reduced vibration. If the counterbalances are not placed right the result is apt to produce greater and not less vibration. Lighter pistons and rods will reduce the vibration a great deal, but they do not reduce the rotative unbalance in the shaft. This latter is what the counterbalances will take care of if they are properly installed.

TRACTOR DRAW-BAR PULL

Q—Explain how the number of pounds draw-bar pull is figured on a tractor.

2—Why is it that one tractor which has more power than another, is rated with less pounds draw-bar pull?

3—Does the Buick company make the Chevrolet car?

4—Does the Buick company make all

of the overhead valve engines?—Reubin Anderson, Pine Bluff, Wyo.

1—The number of pounds of draw-bar pull is determined by the use of a dynamometer.

2—This is due to the means of transmitting the power.

3—No.

4—Yes.

MAXWELL OILING SYSTEM

Q—Explain the oiling system on a 1914 Maxwell 4-35.

2—What is the size of the engine and what is its maximum revolutions per minute?—Mark L. Putnam, Richmond, Kans.

The oiling system used on this model is what is known as the vacuum oiling system. It has a great similarity to the inverted bottle idea used extensively for drinking purposes. The oil is contained in an air-tight reservoir on the left-hand side of the lower half of the crankcase. Running from the lowest point in this reservoir is a tube cast integral, which extends into the center of the crankcase, the opening of which is at the proper oil level. The oil from the reservoir empties through the drain tube into the crankcase until the oil in the crankcase reaches the level of the reservoir outlet. This seals the opening as no air can enter the reservoir, a small amount of oil leaving it causes a slight vacuum in the reservoir which prevents a further flow of oil. When the level is lowered by the consumption of the oil used for lubricating purposes, a little more flows in to take its place, so that during the operation of the engine there is a slow gradual feed of oil from the reservoir, keeping the level in the crankcase constantly at the same height.

2—4 by 4.75 in. bore and stroke. We do not know the maximum number of revolutions of this engine.

REMOVING HUDSON PISTONS

Q—Can number 1, 2, 5 and 6 pistons be removed from a Hudson Super Six without taking off cylinder block? If so, instruct how to remove them and give the position the crankshaft must be in.—Fred F. Kelly, Topeka, Kans.

A method by which one or all of the pistons of the Hudson Super Six can be removed in a very short period of time without removing the cylinder block is as follows: Take down crankcase oil pan. Remove crankshaft weights Nos. 2 and 7. Remove the studs which hold these weights. Disconnect connecting rod crank-end bearings and pull connecting rods and pistons Nos. 1 and 6 down on the left-hand side of the crankshaft. Pull Nos. 2 and 5 down on the right-hand side of the crankshaft which is the camshaft side. Pull Nos. 3 and 4 down on either right or left side of the crankshaft. When assembling, be sure that the crankshaft studs are put in with white lead and are drawn up tight.

COMPRESSION SPACE

Q—What percentage of piston displacement is allowed for the combustion chamber of the latest refined engines of this year's development of the best designers in America? How is this figured?

2—What percentage of the piston displacement is the area of the exhaust and inlet ports of the Roberts' two cycle engines.

3—What is the latest development in the thickness of two-cycle cylinder walls of say 3.5 in. bore?—Ira Cunningham, Covington, Okla.

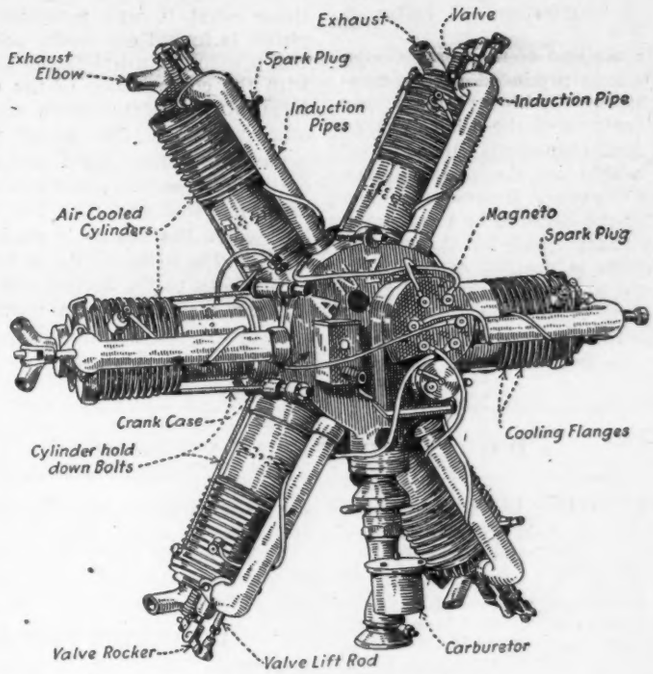


Fig. 5—6-cylinder Anzani engine

1—This is a question that we cannot answer with any positive statements. Present-day engines are designed to work with a compression ratio of 4.5 to 1. The piston displacement volume is equal to the bore squared, times the stroke times .7854. The volume of the compression space will be the piston displacement volume divided by the compression ratio. From these average conditions the combustion chamber occupies about 14 per cent of the total displacement.

2—We have no information concerning this engine in our files.

3—We advise taking this matter up with the Roberts Motor Mfg. Co., Sandusky, Ohio.

TIMING GEAR HOWL

Q—Outside of installing new gears, is there any way to quiet howling timing gears in a Hudson super six. This is especially noticeable at a speed of from 20 to 30 m.p.h.

2—There is also a rattle or very loud click coming from the front of the generator at 8 to 16 m.p.h.

3—Is there any way to set the generator so it will not run ahead of the engine speed, no matter how slow?—R. W. Eddy, Waterloo, Iowa.

1—A noise of this kind will often develop as a result of loose bearings or badly worn gears. If to compensate for the bearing wear, the gears have been adjusted for clearance, it is very likely that the shaft has been lifted slightly and the gears have been thrown out of line. Examine the camshaft bearing and also the crankshaft bearing and if badly worn and the gears are in good shape, the installation of new bearings may remedy the trouble. It may be that the noise is due to lack of lubrication.

2—It seems from your description that the shaft is loose. Take a block of wood or a screwdriver and apply pressure to the shaft in all directions and see if the rattle is reduced. When you find in what direction the play is obtained, you can make the necessary adjustments.

3—We do not understand how the generator can lead the engine speed, as it is the engine that drives the generator. Generators are designed to run at a specified speed which may be engine speed or at a speed in direct relation to the engine speed. If you wish to reduce the charging rate it can be accomplished by adjusting the third brush. Moving the third brush in the direction of rotation will increase the charging rate and moving against the direction of rotation will decrease it.

GASOLINE CONSUMPTION

Editor Motor Age: From time to time I have noticed questions from some of the readers concerning larger valves for the Ford engine. I secured a set of valves from a Fordson tractor, which has a stem the same diameter as the regular valve but a little longer and cut some of the ends of the stems. Also reamed out the ports and then cut a new seat with a tractor reseating tool and ground them in. I notice quite a difference in power and pickup but the engine does not idle quite as well as before and it uses more gasoline.—Frank Ellis, Arvada, Colo.

Editor's Note—It is very logical that engine should use more gasoline as you have increased the size of the intake. The failure to idle is probably due to improper seating of the valves or a poor fit of the valve stem. In many cases where the valve stem becomes worn so that the valve will spin, air is permitted to enter through the valve and it is impossible to get an accurate carbureter setting at low speeds.

GAS EXPANSION RATE

Q—What is the rate of expansion of gasoline gas. That is, how much does the pressure in a cylinder increase for a given compression. Assuming the compression to be 60 lbs. What pressure will this expand to when lighted by the spark, assuming that the carbureter is properly adjusted so as to furnish the proper

amount of air to gasoline?—F. Slater, S. Kaukanna, Wis.

At or near the end of the compression stroke a spark is produced in the compression chamber which ignites the charge. If ignition of the whole charge took place instantaneously, the end of the stroke would be the proper place for the spark to occur. However, it takes some time for the flame to be propagated through the charge, and for this reason when the engine is running at relatively high speed, the spark must occur slightly before top dead center for the best results. Upon ignition the pressure suddenly rises to between four and five times what it was previously and the piston is forced out under this pressure. The pressure multiplication factor varies with the compression of the charge, the form of the compression chamber and other variables. The actual pressure in a gasoline engine upon ignition is generally between two hundred and fifty and three hundred and fifty lbs. per square inch when the engine is working at full power. The pressure drops very rapidly, owing both to the increase in volume of the gases as the piston moves outward and to the abstraction of heat by the cylinder walls.

The Electric System

CONNECTING CUTOUT

Q—We desire to charge 6-volt storage batteries with a Gray and Davis starter generator MG9 type. The regulator is worn and burned. We have another but cannot use the three wires that attach. Illustrate where to wire the wires, using a pulley and belt on a small engine. Explain the internal connections by diagram or otherwise.

2—Should a current be found at all segments of motor-generator when one segment is in contact?

3—Show by diagram, the internal wiring of the Studebaker 1913 12-volt Wagner.

4—What is the output of this generator? We also wish to use one of these to charge the storage batteries.—R. B. G., Waterloo, Mont.

1—Fig. 7 shows the internal connections of both the generator and the cutout and illustrates the general principle of connecting a cutout. Since we do not know what kind of a cutout you have, it is impossible to furnish a diagram or explain the method of connecting it.

2—Yes, there is current in every coil except when it is in one position. Taking one coil for example, the current will build up reaching its maximum at 90 deg. and then decrease becoming 0 at 180 deg. In others a zero point will be reached every 180 deg. or one-half a revolution of the coil.

3—We have no diagrams in our files that show the internal connections of the Wagner generator. We advise taking the matter up with Wagner Electric Mfg. Co., St. Louis, Mo.

4—We do not know the exact capacity of the generator but the maximum output will not exceed about 20 amperes.

REGULATOR TROUBLE

Q—With the engine running fast enough to start generating, on a 1917 Maxwell car, Simms-Huff system, on the regulating side of the relay of a dynamo regulator, the regulator points keep opening and closing to the full extent of their travel, causing a clicking like a set of telegraph instruments, and, at higher speeds, to cause the cutout points to open and close which also causes the indicator to keep flapping from "charge" to "off." Have looked over all wiring and installed new field resistance but the trouble still persists.

2—What is a good average starting current in amperes of the Chevrolet 490, Buick D45 and Dodge Brothers 1920 model cars, engines in good condition and at room temperature of 60 to 70 deg. Fahr.?—George Braun, Campbellsport Auto Sales Co., Campbellsport, Wis.

1—This seems to indicate improper adjustment of the spring which controls the cut-in point. Refer to Fig. 10. Remove the four screws which hold the panel on the dash, and tip the panel over so as to make the wiring on the back of the panel accessible. In case the wires are not long enough to permit pulling the panel out, the wires should be gently pulled out to create enough slack to allow the panel to be tipped back. With a screwdriver remove the terminal on back of ignition switch marked Bat. and insert a good ammeter of suitable range in this circuit. Care should be taken to see that no grounds are made while connecting the ammeter. The next step is to remove the screw which holds the cover on the regulator box. Use a pair of thin nosed pliers and bend the hook (1) on cut-out armature (2) so as to increase the tension on the clock spring (3) which is used for adjusting the cut-in point. The engine should then be started and run at a speed corresponding to a car speed of 15 to 20 miles per hour and the charging rate adjusted to between 13 and 15 amperes by bending the hook (4). In making this adjustment it is wise to press the regulating armature down so that the current will not get to an excessive value and blow the fuse.

2—This is a question which we cannot answer positively. In the six-volt systems, the armature locking current, or in other words, the amount of current necessary for the initial turnover of the engine is about 550 amperes and, of course, the amount of current consumed is reduced as the load is reduced. In the 12-volt systems, the locking current will be about 250 to 300 amperes and the action of reducing the current according to the load will be the same as the six-volt system.

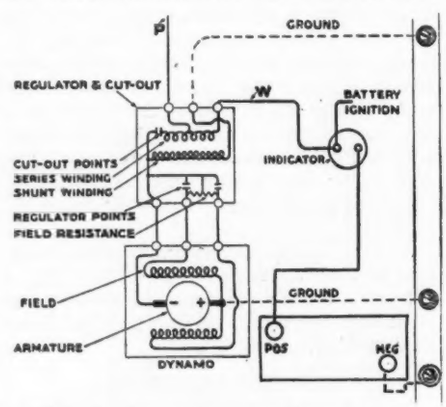


Fig. 7—Internal connections on the Gray and Davis generator and cutuot

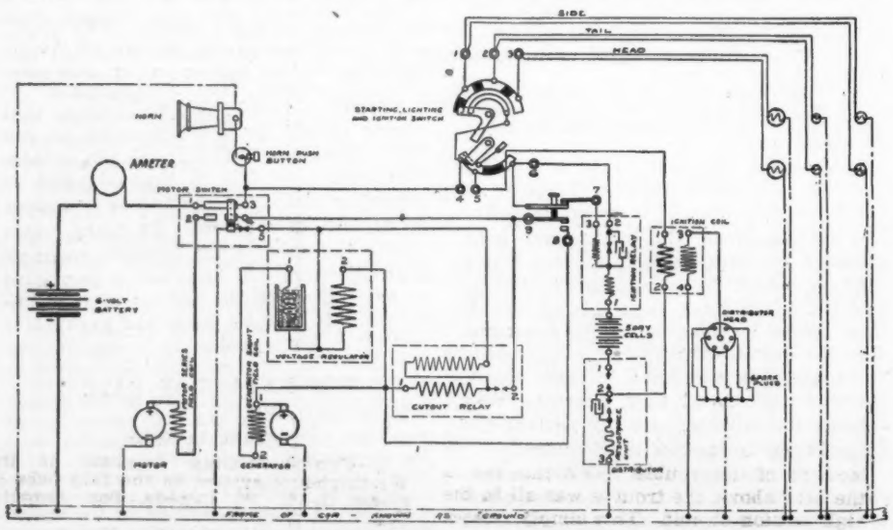


Fig. 6—Ammeter installation on a 1914 Oldsmobile 54

AMMETER INSTALLATION

Q—Publish wiring diagram of the 1914 Oldsmobile 54.

2—Instruct how to connect ammeter in this circuit.—Chas. Briggs, Chicago.

1-2—Wiring diagram of the Delco system on the 1914 Oldsmobile 54 is shown in Fig. 6. The ammeter is indicated in dotted lines. Use a Roller Smith ammeter that will read 20 amperes charge and 20 amperes discharge made by the Roller Smith Co., 233 Broadway, N. Y.

DOUBLE IGNITION

Q—If two spark plugs were installed in a Waukesha tractor engine instead of one will both plugs fire at the same time? Is it necessary to install a different magneto?

2—Would equipping the engine with two spark plugs to each cylinder and high compression rings give more power?—Chas. E. Gregory, Howard, Kans.

1—If you wish to use two spark plugs you will have to install a double ignition

system. The present magneto is not designed to furnish as much current as necessary for this system and if the two plugs were connected it is very probable that one of the plugs would get all of the current or both would get a little, and the result would be very weak ignition.

2—The use of two spark plugs per cylinder and very good compression will certainly give more power.

NORTHEAST ARMATURE

Q—Publish wiring diagram of the Northeast armature used in the motor generator that is standard equipment on the 1919 and 1920 Dodge car; showing the conductor spacing and commutator connections.—C. E. Fields, San Francisco, Calif.

We do not believe this information is available but some information may be obtained by writing to the Northeast Electric Co., Rochester, N. Y.

STARTING MOTOR AS GENERATOR

Q—The Dyneto generator on a 1919 Birch does not generate current until the car speed of 15 miles has been reached. Instruct how to increase the charging rate.

2—Is it possible to change a motor of a two unit electric system to a generator without a complete rewinding?—Mark L. Putnam, Richmond, Kans.

1—In the first place it would be advisable to examine the brushes and see that the commutator is clean. The charging rate is regulated by the third brush method. To increase the charging rate, the third brush is moved in the direction of rotation and to decrease the charging rate, the brush is moved against the direction of rotation.

2—This machine is designed primarily for starting purposes and to run as a motor. Although it will operate as a generator, it will not give satisfactory results and, consequently, the only thing to do is to rewind. If run as a generator as it now is, you will get a very low voltage and a high amperage.

DODGE AMMETERS

A statement was made in the July 8 issue of MOTOR AGE that the Dodge cars were not equipped with ammeters as factory equipment. From May, 1918, until September, 1919, all cars were equipped with either an ammeter or a current indicator and since that time all of their cars have been equipped with ammeters.

REVERSED FIELD CONNECTIONS

Q—Was called upon to connect up a starter and generator of the Leece-Neville system. Each separate units. Leaving starter out of question. The generator failed to operate or "charge." Upon inspection found generator was O. K. if run in a clockwise direction, but through error same was mounted anti-clockwise. To correct this is it necessary to reverse brush position or fields, or both. Know same could be corrected with an idler gear.—F. Martels, Hatchogue, N. Y.

Leave the brushes as they are and reverse the field connections. After making this change it may be necessary to shift the position of the brushes slightly to prevent sparking.

FAULTY HIGH TENSION CIRCUIT

Editor, Motor Age.—In the June 17 issue of Motor Age I noticed the question of C. R. Jefferson concerning the "Missing

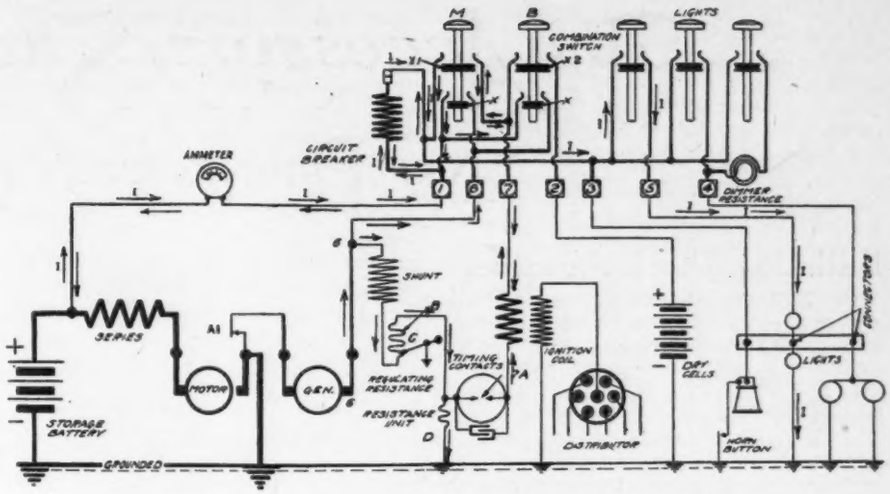
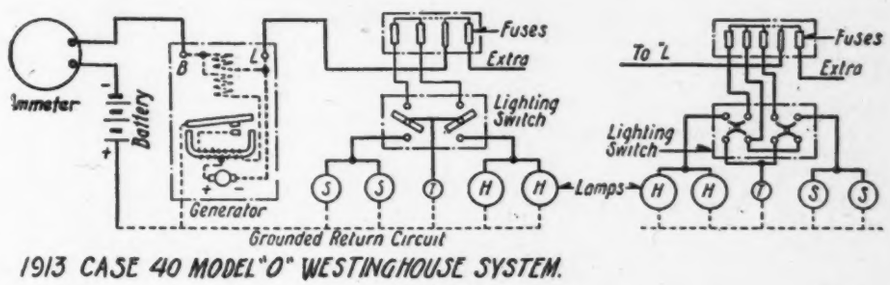


Fig. 8—Wiring of the 1916 Hudson model 6-40



1913 CASE 40 MODEL "O" WESTINGHOUSE SYSTEM.

Fig. 9

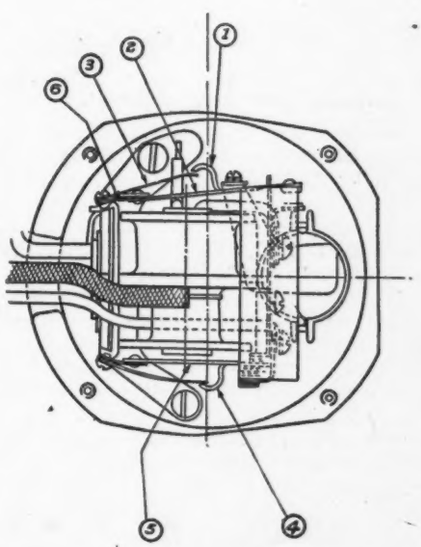


Fig. 10—Layout of Maxwell cutout and regulator

of an Essex." I was bothered for several weeks with ignition trouble which I laid to the carbureter, but found that upon installing new ignition wires "high tension," the trouble was overcome. The symptoms indicated lack of gasoline.—D. V. Russell, Laona, Wis.

Editor's Note.—The question of missing is one that involves many possible factors, and, of course, a process of elimination is the method of determining the location of the trouble. As mentioned in the case above, the trouble was all in the high tension circuit. This simply relates back to the proper system of so-called shooting trouble. The first thing to look for in the case of trouble is gasoline supply; second, condition of ignition. As a general rule these two factors will locate the trouble in short order.

CHARGING AND BATTERY CIRCUITS

Q—In a 1916 Hudson 6-40, explain which wires the current from the battery goes through for light, ignition, etc., when the car is idle. This motor-generator has four terminals all connected together by the large terminal at the end of the cable coming from the battery. When the generator is charging the battery, which wires does the current flow through? Where should an ammeter be connected? Sometimes we have trouble starting the engine but if we connect a wire from 1 to 2 it can be started easily.—Daniel Moran, Brownsville, Tex.

Fig. 8 shows the system used on this car and the direction of flow of the current when the engine is not running is indicated by the arrows marked I. The plain arrows indicate the circuit when the generator is charging. If the engine is throttled down very low, say about three miles per hour, you will find that the over-running clutch is in operation the same as during the starting operation. An ammeter can be installed as shown on this diagram. By making the connections from 1 to 2, you are connecting the dry cells in parallel with the storage battery, and if the battery is low, it is natural that the dry cell will supply sufficient current to give better starting.

CASE WIRING

Q—Publish wiring diagram of the Westinghouse system on the 1913 Case 40 model O.—C. W. Canady, San Antonio, Tex.

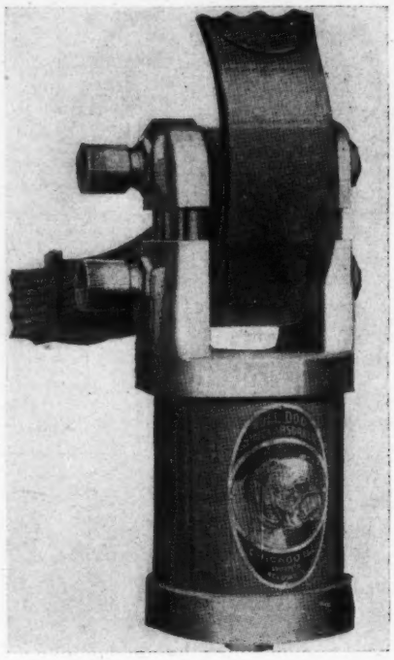
The diagram is shown in Fig. 9.

The Accessory Show Case

New Fitments for the Car

Bull Dog Shock Absorber

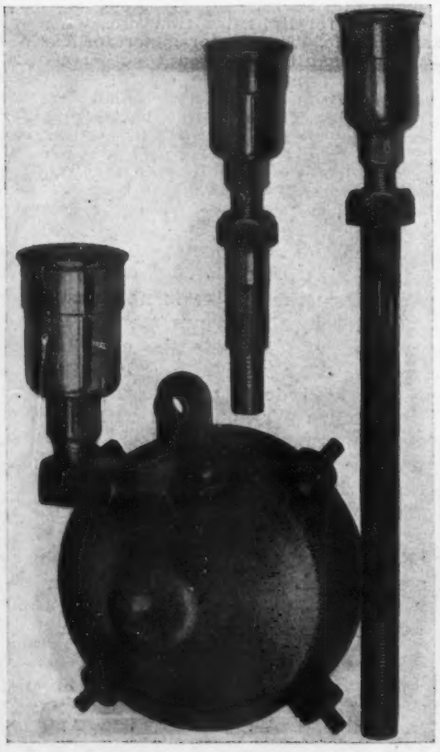
The Bull Dog shock absorber is simply two spiral springs inclosed in a waterproof and dirtproof case with means of attaching between the upper and lower members of a flat spring. Instead of the use of spiral springs there are eight rods in each absorber, each rod having a two inch bearing; in addition, this absorber has an adjustment screw so that it can be adjusted for varying loads without removing any part of the absorber. It is self lubricating, from grease within the case. The Bull Dog shock absorber, which is manufactured by the Van Brass & Specialty Co., Chicago, can be attached to all cars fitted with quarter elliptic or semi-elliptic springs, and the price per pair ranges from $20 to $25.



Bull Dog shock absorbers

Tungsten Spark Plug

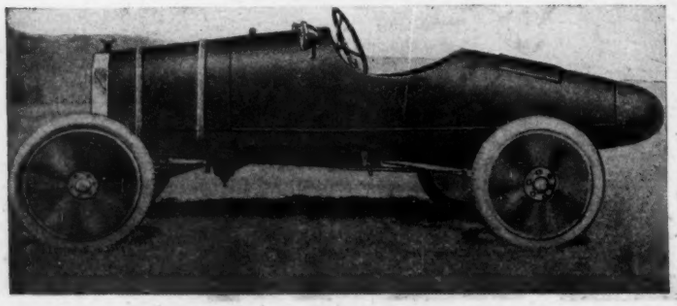
A new type spark plug, shown in the illustration, is being placed on the market by the Tungsten Mfg. Co., Marshalltown, Ia. Tungsten mica small hex has a double mica insulation. Mica is first wound laterally around the center stem, then protected by washers. It comes in all sizes and is especially adapted to air-cooled engines and tractors. Can be furnished with Franklin terminal.



Felix oil cup for Fords

Felix Oil Cup for Fords

Three interesting applications of the Felix oil cup have been made to Ford parts by the Felix Mfg. Co., 4437 N. Clark St., Chicago. The Ford timer, which is a much abused part of the Ford car, is provided with a cup as the picture illustrates. This cup will lubricate the revolving parts with a steady dripping flow of oil, measured accurately to prevent over-lubrication. The other applications are to the tie rod bolt and to the steering knuckle bolt. These parts of the Ford are not provided with hollow bolts and means for attaching any lubrication cups, so this company makes the whole unit with the cup attached. The Felix cup, which has been described to our readers before, is a wick and pressure feed cup. The top cap is lifted off and an oil can inserted to fill the cup. Pressing down forcibly on the top cap will create a pressure of several hundred pounds which is sufficient to force any dirt out of the oil passages. When the pressure on the cap is released, the cup feeds regularly a small supply of oil.



Red-I-Kut patterns for car building

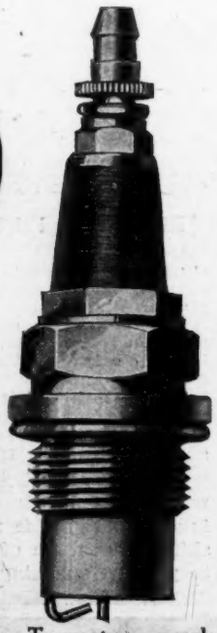
Red-I-Kut Patterns

The Red-I-Kut system of motor car body building consists of a set of life-sized printed patterns of each part of the body, together with simple instructions covering the construction of the same. The material to be used may be had at the average small town hardware store or lumber yard. It is stock size and the various parts cut from it have very little waste. Three types of sport bodies have been standardized for the Ford, one of which is shown in the illustration. These patterns are built by the Kuempel Co., Guttenberg, Iowa, the type illustrated selling for $6.

Walker Porcelain Timer

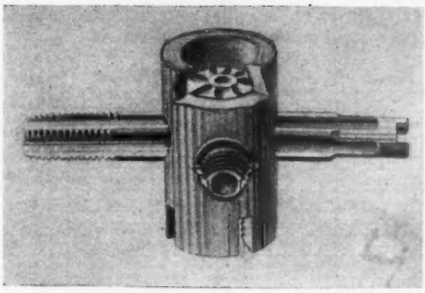
The timer shown in the illustration is of the brush or magneto type and is made of steel and sufficiently strong to give long service. The hardened steel contact points are embedded in a smooth porcelain race, which is part of the shell, thus overcoming a common trouble, as it is impossible to become soft and bumpy. This instrument is manufactured by Walker Accessories, Inc., 1991 Broadway. New York, and sells for $1.75.

Walker porcelain timer



Tungsten spark plug can be furnished in all sizes

Service Equipment
Time Savers for the Shop



Schrader universal valve repair tool

The HB 10 Battery Charging Outfit

The new HB 10 battery charging outfit, illustrated herewith, is the latest addition to the line of battery chargers manufactured by the Hobart Bros., Troy, O. It is furnished complete, as shown, ready to attach to city power lines. It charges one to ten 6-volt batteries or their equivalent at one time. The switch board is mounted on top of the machine, with ammeter, pilot light, field rheostat, necessary line and fuse switches Full details and prices may be obtained from the manufacturer.

Schrader Universal Valve Repair Tool

The Schrader Universal is a five-in-one valve repair tool. It repairs the inside thread on valves, outside thread on valve stems for valve caps, smooths down valve cap washer seat on valves, removes or inserts valve inside, and deflates tube by holding valve inside down by screwing deflator into mouth of valve. It is manufactured by A. Schrader's Son, Inc., Brooklyn, N. Y., and sells for 35 cents.

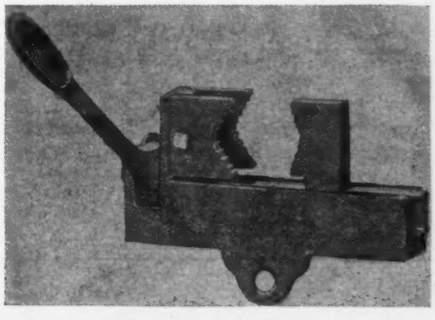
Silverine Solders

The Silverine Solders being manufactured by the MacKenzie-Waterhouse Co., Inc., 717 E. Pike St., Seattle, Wash., consist of Silverine hard, Silverine soft, Silverine aluminum, and Silverine cast iron welding flux. These various solders can be applied in many ways and are adaptable for most every kind of soldering work. Silverine hard is especially adapted to conditions where extreme adhesive qualities and resistance to high temperatures are required. Silverine soft is applicable to sheet metal work, radiator and fender repair and similar types of construction work. Silverine aluminum is plastic and adapted to building out parts where the broken piece has been lost and is used for repairing crankcases, aluminum hoods, bodies, manifolds, etc.

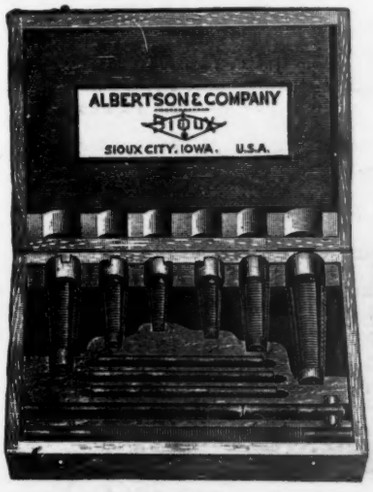
Full instructions for applying silverine solders are furnished by the manufacturer.

Pipe Vise

The Pipe Vise, shown in the illustration, is small and compact, weighing but 6 lbs. All working parts are drop forged. The steel malleable base is operated by cam movement, open top quick adjusting, from ⅛ to 3 in. with one move of the hand. The Efficient Vice and Wrench, Cleveland, manufacturers of this product, also build a pipe vise, pipe bender and stand which weighs but 14 lbs. complete.

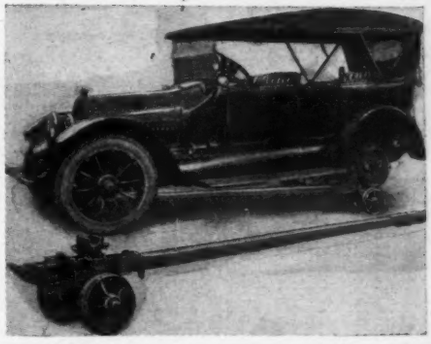


Efficient pipe vise



Sioux bushing remover

Repairs with Silverine solders



The Holmes wrecking truck can be used under front or rear axle

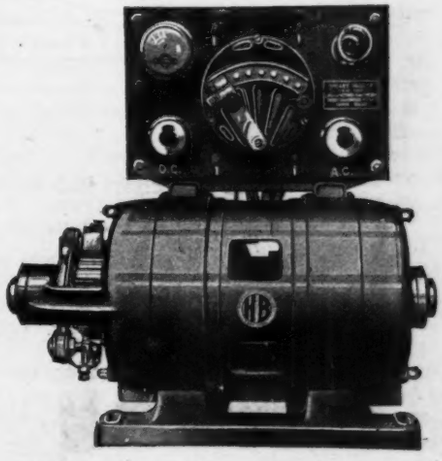
Holmes Wrecking Trucks

The wrecking truck shown in operation in the illustration is a piece of service equipment that every service station has use for. It can be arranged for use under either front or rear axle. The frame and wheels are made of malleable castings and the tongue is made of second growth ash. The wheels revolve on roller bearings. The axle rest is made of malleable castings and is adjustable to any size or shape axle, front or rear. The tongue is heavily ironed so it can be used as a pry if necessary.

The total weight of the truck is 146 lbs. and is manufactured by the Robt. Holmes & Bros., Inc., Danville, Ill.

Sioux Bushing Remover

The bushing remover shown is a very simple tool, designed to remove worn out bushings with little difficulty and with the least effort. The standard set as shown herewith can be used to remove bushings from ⅜ of an in. to 1 3/16 in. The price of a complete set as listed by Albertson & Co., Sioux City, Iowa, is $18.

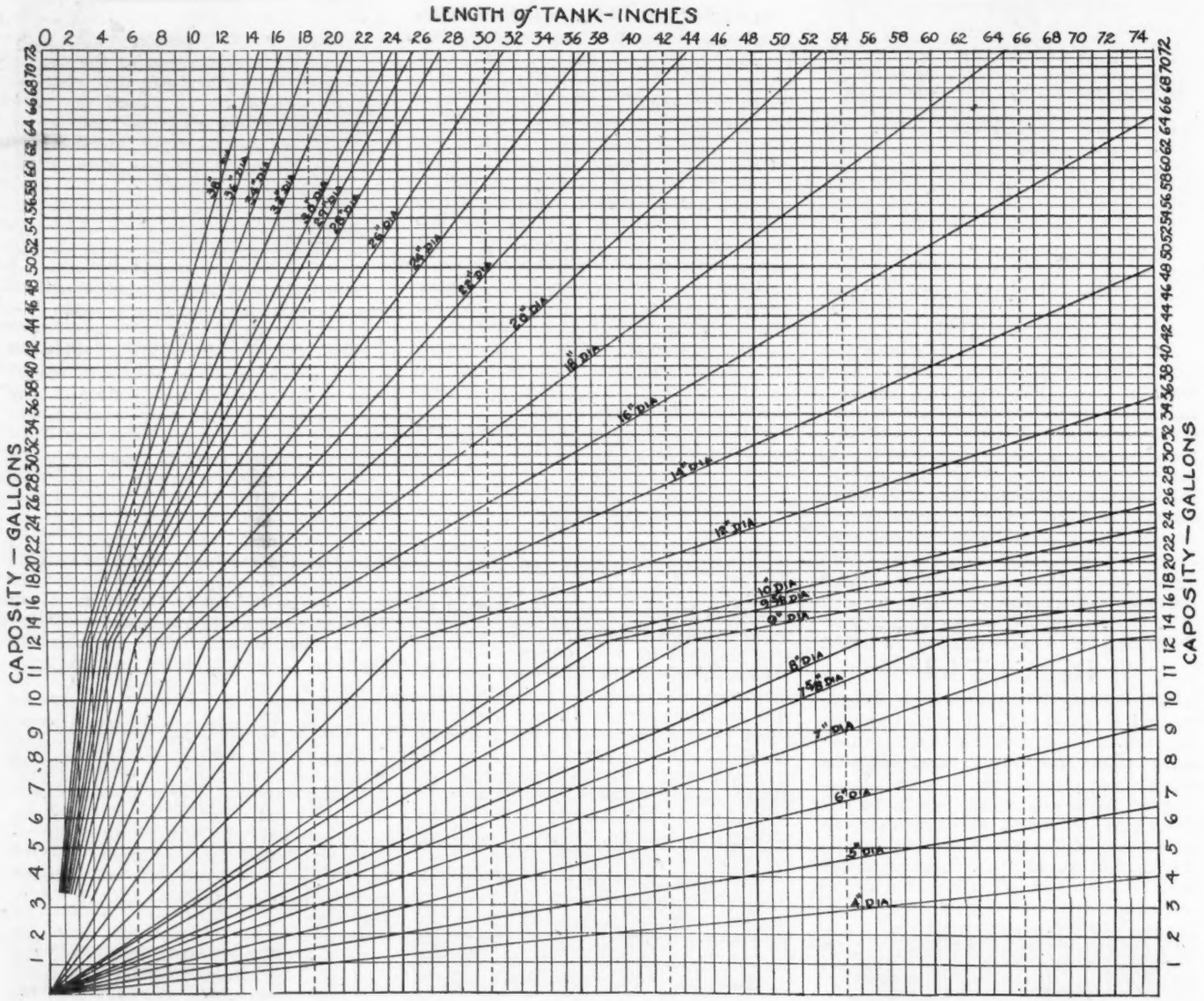


Hobart Bros. battery charging outfit

CHART FOR DETERMINING TANK CAPACITY

Motor Age Maintenance Data Sheet No. 107

One of a series of weekly pages of information valuable to service men and dealers — save this page



With this chart it is possible to determine tank capacity for cylindrical tanks up to 38 in. diameter and 75 in. in length, or by knowing the desired capacity and the proportions of the dimensions, the exact measurements can be determined by a reversal of the process used in determining capacity. As an example of its use, assume a tank 26 in. in diameter and 30 in. in length, to find its capacity in gallons. At the top of the chart is found the scale corresponding to tank length. Find the line for 30 in. length and follow it down to the diagonal line for 26 in. diameter and from this point move horizontally either to right or left and find 69 gallon mark, which is the capacity

Law in Your Business

By Wellington Gustin

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty problems as may be submitted to him.

Spark Sets Fire to Gasoline Causing Death of Employee

Wherein the Garagekeeper Liable For Negligence

A PECULIAR accident for which the garagekeeper was charged liable comes from the Court of Appeals of Georgia. It appears that a youth was employed by the garagekeeper about his place of business. A gas tank with a patent pump attached thereto was maintained at the garage. The pump was operated by electricity controlled by a switch attached to its tank, which when cut off while the pump was "pulling" and the batteries running, emitted an electric spark. Gasoline had escaped and covered the pump and surrounding ground, and also saturated the clothes of the employee, and a spark from the batteries set fire to the escaped gasoline and the saturated clothes of the employee, causing the death of the latter.

Suit to recover from the garage man was dismissed by the trial court, but the Court of Appeals reversed this judgment. It said, where such pump could as easily have been operated with the switch located elsewhere and some distance from the pump and the tank, and where the garage owner knew of the escaping gasoline, the question of the garagekeeper's negligence in maintaining the switch so located, and in shutting off the electric current by means of the switch under such circumstances, thus generating an electric spark which set fire to the escaped gasoline, was a question for the jury to decide.

The Rule in Conditional Sales As Applied in Oregon

Conditional Seller May Resell Machine and Recover Balance Due on Account —Conditional Sales Sufficient Consideration to Uphold Contract

IN A recent case involving the conditional sale of a tractor, which had been recovered and resold under a chattel mortgage, Justice Bean of the Supreme Court of Oregon, speaking for that court, stated the rule followed in Oregon to be that, where one of the remedies, provided in a contract for the sale of property containing a reservation of the title in the seller until payment of the purchase price, is the right, on default of the buyer, to seize and sell the property at public or private sale and apply the proceeds toward the payment of the purchase price, and the seller exercises this right, he is entitled to recover from the buyer any balance remaining after so crediting him with the proceeds of the resale.

This rule upholds the contract of conditional sale as made by the parties themselves. While in some instances, the rule may work a hardship upon the buyer, on the other hand, where personal property is sold under such a contract, and on account of the leniency of the seller in enforcing payments, the property has deteriorated, where the same is machinery, as an automobile or tractor, it might be worn out and practically worthless, the seller would receive practically no compensation for it were he only allowed to retake the property. This would at least tend to render it difficult for people to obtain credit and purchase property under such conditional contracts.

Bean says there are numerous forms of conditional sale contracts which have apparently caused many divergent opinions relating to questions arising under them. Many such contracts of sale provide that on default of the buyer the seller may take possession and sell the property on account of the buyer, crediting him with the proceeds of the resale, and hold him liable for any deficiency in the price. As a general rule, the validity of such a provision in the contract is given full effect by the courts, and the seller is held entitled, after a resale in accordance with the provisions of the contract, to sue and recover any balance remaining after crediting on the purchase price the proceeds of such sale. This effect has been given by the courts to a provision authorizing the seller to retake possession and resell, as this necessarily implies that the resale shall be on account of the buyer, and that any deficiency in the satisfaction of the price shall be paid by the buyer.

The construction to be placed upon a conditional sales note and contract depends upon the terms thereof, and no fast rules can be laid down to affect such agreements. But a contract of conditional sale, giving possession and use of the property to the buyer while title remains in the seller until full payment, affords a sufficient consideration for the buyer's absolute promise to pay the agreed price.

MANUFACTURERS' CREDIT MANAGERS MEET

Concluded from page 19.

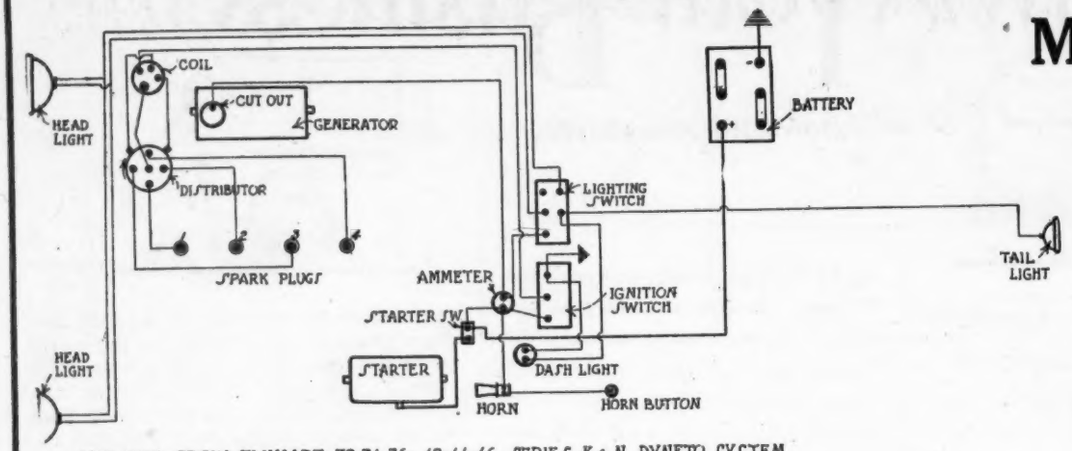
It was brought out forcibly that the real trouble lies in the fact that the manufacturers ordered too heavily in their over-enthusiasm and the statement was made that in the Detroit district schedules had been readjusted by every company save three.

Contrary to general belief, it developed at the meeting that there is no slacking up in truck demand and a survey of every company in the truck field indicated that their products were moving steadily, though production had been curtailed in most factories.

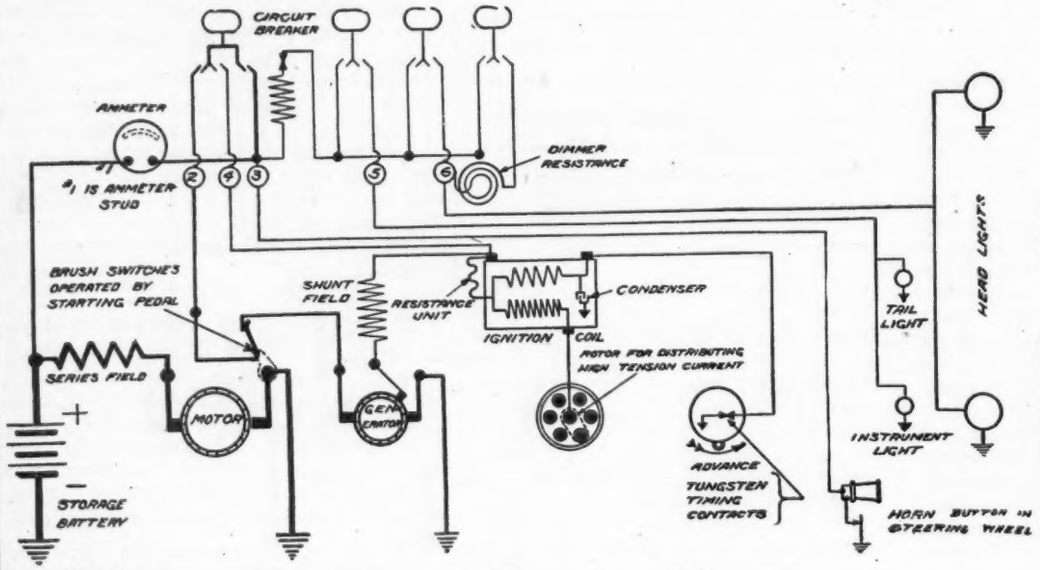
Deferments and cancellations in almost every instance, it was shown, were due to the effort on the part of the manufacturers to balance their inventories rather than because of a lack of demand. An unusual number of cars and drafts in transit, it was declared, was the chief cause of a tight money condition in many of the factories and it was contended the automotive industry had been favored rather than discriminated against by the banks. A slowing up until conditions adjust themselves and the period of absorption of outstanding paper and cars in transit is past was said to be necessary.

Fictitious orders from dealers who, during the abnormal conditions existing a few months ago, doubled their demands were held responsible largely for conditions for the simple reason that the dealers, unable to finance that increased output, were compelled to cancel. It was made clear that the situation means simply a survival of the fittest and the elimination of the shoe-string operator.

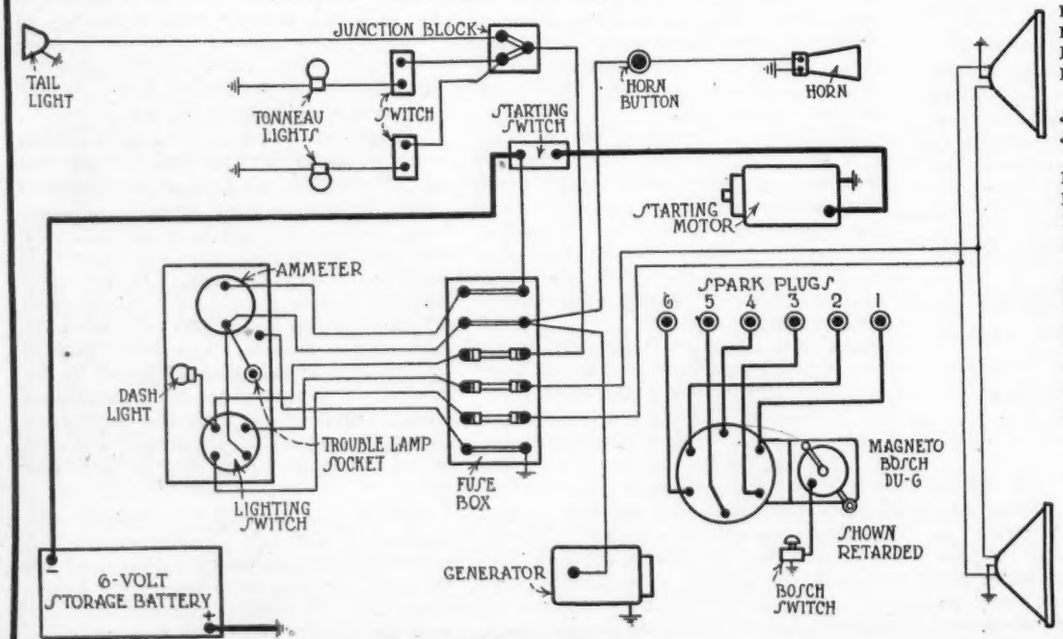
Motor Age Weekly Wiring Chart No. 88



1919-1920 CROW-ELKHART 32-34-36-42-44-46 SERIES K & N DYNETO SYSTEM



1916 Moon 6-30 and 6-44—single unit Delco system



1916 LEXINGTON 6-N WESTINGHOUSE SYSTEM

Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
Briscoe—May 6, '20
Buick—July 15, '20
Chalmers—June 17, '20
Chandler—May 20, '20
Cole—June 10, '20
Dodge—July 1, '20
Elcar—May 6, '20
Franklin—June 3, '20
General Battery Charging—Sept. 15, '19
General Magneto Diagram—June 5, '19
Harroun—July 15, '20
Haynes—June 24, '20
Hupmobile—May 27, '20
Internal Connections—July 10-17-24, '19
Jeffery—May 13, '20
Jordan—June 10, '20 - July 22, '20
King—May 20, '20
Kissel—May 27, '20
Locomobile—June 6, '20
Moline-Knight—May 20, '20—July 22, '20
Moon—July 8, '20
Peerless—May 13, '20
Pierce-Arrow—July 15, '20
Reo—July 22, '20
Studebaker—July 1, '20
Stutz—July 8, '20
Special Systems for Fords—May 15-22, '19

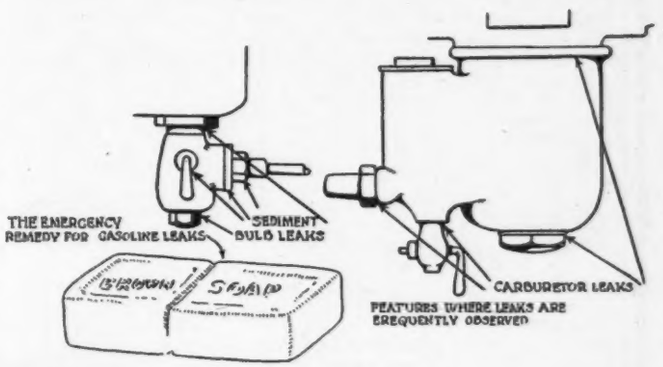
The Automotive Repair Shop

Practical Maintenance Hints

Soap To Prevent Gasoline Leakage

Around leaky gasoline connections, valves and even around the carbureter bowl, a coating of common brown kitchen soap pressed on with the tip of the finger, will effectively prevent the leakage and waste of gasoline.

While this is not recommended to replace the proper repairing, it is the best kind of an emergency repair and will last for months or until the proper correction can be made. The dirt and grease should be wiped off before applying the soap.


THE EMERGENCY REMEDY FOR GASOLINE LEAKS
SEDIMENT BULB LEAKS
CARBURETOR LEAKS
FEATURES WHERE LEAKS ARE FREQUENTLY OBSERVED

Soap spread around a leak in the carbureter or connections will serve as a temporary repair until the proper methods are at hand

Handy Method For Heating Soldering Iron

A can of solidified alcohol, common to most households, is a convenient means of heating the soldering iron within the garage when attempting small jobs of soldering on the radiator, electric wiring, etc. It is advisable even to carry one under the rear seat for emergencies. A tube of the granular solder, end of a tool or iron and the canned heat make it possible to repair a gasoline leak, radiator or broken wiring connection at any time, besides the solid alcohol is useful for other purposes; rubbing it on the windshield in rainy weather has been found very effective.

EFFECTIVE IN RAINY WEATHER TO USE ON WIND SHIELD
CONVENIENT TO CARRY IN THE CAR AT ALL TIMES
SOLIDIFIED ALCOHOL
GRANULA SOLDER IN TUBE
SOLDERING IRON

Handy method of carrying soldering materials in the car for roadside repairs

Renewal of Oil Saves the Engine

Lubricating oil in the crankcase of the gasoline engine should be changed after each fifty hours running in a stationary engine or five hundred miles in the automobile engine. When oil has been in use for this period of service it becomes contaminated with gasoline, dust and carbon that is burned on the under side of the piston head.

Turn an engine over slowly with the oil in this condition and note the heavy drag with a lack of liveliness in the compression.

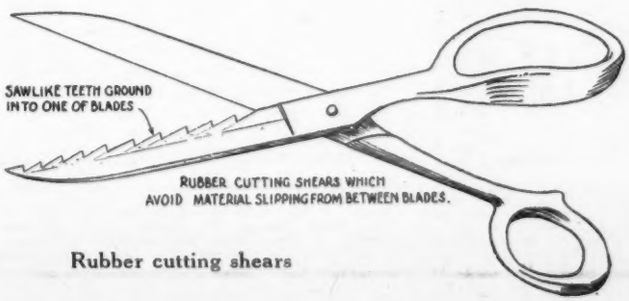
Drain out the old oil, pour a gallon of kerosene into the crankcase to thoroughly wash out the sediment, then refill with fresh oil.

Immediately the drag is eliminated and the pistons are lively, they rock back and forth against the compression, and if the spark plugs are removed, the engine turns over with the slightest effort.

The old oil can be used for the springs, wiping off the under side of the fenders and the running gear, thereby preventing rusting, and is also good to prevent rusting of tire chains.

Rubber Cutting Shears

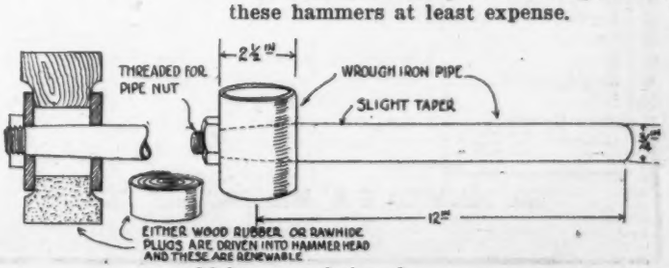
A simple modification, as shown in the illustration, to a pair of shears or scissors, permits of cutting sheet rubber, packing, etc., and is of especial advantage to the repairman on inner tubes and automobile tire repairs. This consists of grinding one blade of the cutters with saw-like teeth. These grip the rubber and prevent it sliding from between the blades, as it usually does.



Rubber cutting shears

Making a Soft Face Hammer of Pipe

A soft faced hammer of simple construction is shown in the illustration. This may be fitted with either wooden, rawhide or rubber faces, or two faces of unlike material. Another advantage is when they are worn down they may be removed and renewed by simply driving in new pieces. For work around glass windshields, fenders, bodies, radiators, or varnished surfaces of the automobile the soft face hammer should always be used and this method shown provides these hammers at least expense.


THREADED FOR PIPE NUT
2½"
WROUGHT IRON PIPE
SLIGHT TAPER
12"
EITHER WOOD RUBBER OR RAWHIDE PLUGS ARE DRIVEN INTO HAMMER HEAD AND THESE ARE RENEWABLE

Making a soft face hammer

Motor Age Monthly Guide to Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1	Allis-Chalmers, 18-30	Allis-Chalmers Mfg Co., Milwaukee, Wis	18	30	4	.....	3000	6000	.....	Wh.	50	Own	4 Ver.	4¾ x 6½	830
2	Allwork, C	Electric Wheel Co., Quincy, Ill	14	28	3	28	3000	5000	$1,675	Wh.	48	Own	4 Ver.	5 x 6	800
3	Appleton	Appleton Mfg. Co., Batavia, Ill	12	20	2-3	22	2000	4900	1,500	Wh.	54	Buda	4 Ver.	4¼ x 5½	1050
4	Aultman-Taylor	Aultman-Taylor Machinery Co., Mansfield, O	15	30	4	28	2800	7500	2,300	Wh.	70	Clim	.....	5 x 6½	900
5															
6	Automotive, B-3	Automotive Corp	12	24	2	26	2000	3400	.....	Wh.	40	Herc.	4 Ver.	4 x 5½	1000
7	Aultman-Taylor		22	45	6	32	4800	13000	3,700	Wh.	70	Own	4 Hor.	5⅛ x 8	600
8	Aultman-Taylor		30	60	8-12	.....	8000	23000	4,800	Wh.	90	Own	4 Hor.	7 x 9	500
9	Automotive														
10	Avery, 8-16		8	16	2-3	22x32	1800	4900	.....	Wh.	50	Own	2 Hor.	5½ x 6	600-750
11	Avery, 12-25		12	25	3-4	20x30	2800	7500	.....	Wh.	56	Own	2 Hor.	6½ x 7	600-700
12	Avery, 14-28		14	28	3-4	24x36	3000	7540	.....	Wh.	60	Own	4 Hor.	4⅝ x 7	700-900
13	Avery, 18-36	Avery Co., Peoria, Ill	18	36	4-5	24x36 / 28x46	3500	9250	.....	Wh.	65	Own	4 Hor.	5½ x 6	650-750
14															
15	Avery, 25-50		25	50	5-6	28x46 / 32x54	4800	12500	.....	Wh.	69	Own	4 Hor.	6½ x 7	600-700
16															
17	Avery, 40-80		40	80	8-10	36x60	8600	22000	.....	Wh.	87½	Own	4 Hor.	7¾ x 8	500-600
18	Blue J	Dart Truck & Trac. Corp., Waterloo, Ia	15	30	3-4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½ x 6	1050
19	Boring	Boring Tractor Corp., Rockford, Ill	....	24	2-16	24x36	.....	3600	1,595	Wh.	54	Wauk.	4 Ver.	4⅜ x 5¼	1000
20	Bull	Bull Tractor Co., Anderson, Ind	12	24	2-3	26	1000	4996	1,200	.....	60	Toro	2 Hor.	5½ x 7	750
21	Burn-Oil	Burn-Oil Tractor Co., Peoria, Ill	....	30	3-4	26	3000	5500	1,650	Wh.	56	Own	2 Hor.	6¾ x 7	700
22	Case, 10-18		10	18	2-3	20x28	1665	3820	1,200	Wh.	42	Own	4 Ver.	3⅞ x 5	1050
23	Case, 15-27	J. I. Case T. M. Co., Racine, Wis	15	27	3-4	26x46	2500	6460	1,800	Wh.	52	Own	4 Ver.	4½ x 6	900
24	Case, 22-40		22	40	5	32x54	3760	10300	3,100	Wh.	56	Own	4 Ver.	5½ x 6¾	850
25															
26	Caterpillar, 5-Ton	Holt Mfg. Co., Peoria, Ill	25	40	4	32x52	3100	9400	.....	Cr.	.....	Own	4 Ver.	4¾ x 6	1050
27	Caterpillar, 10-Ton		40	60	6	40x60	5000	18800	.....	Cr.	.....	Own	4 Ver.	6½ x 7	700
28	Cletrac, W	Cleveland Trac. Co., Cleveland, Ohio	12	20	2	24x40	1285	3420	1,395	Cr.	.....	Own	4 Ver.	4 x 5½	1265
29	Coleman	Coleman Trac. Sales Co., Kansas City, Mo	16	30	3	28x48	3000	5200	1,850	.....	44	Clim.	4 Ver.	5 x 6½	750
30	Dakota, 4	Pope Mfg. Co, Watertown, S. D	15	27	3	24	2000	5700	1,750	Wh.	42	Doman	4 Ver.	4¾ x 6	800
31	Dill	Dill Trac. Mfg. Co., Little Rock, Ark	20	....	3	.....	.....	4400	2,480	Wh.	42	Cont.	4 Ver.	4½ x 5½	900
32	Eagle, F	Eagle Mfg. Co., Appleton, Wis	12	22	2-3	24	2400	5850	1,390	Wh.	48	Own	2 Hor.	7 x 8	450
33	Eagle, F		16	30	3-4	28x48	3200	7100	1,850	Wh.	52	Own	2 Hor	8 x 8	450
34	E-B, Q		12	20	3	24	2000	6500	.....	Wh.	60	Own	4 Ver.	4¾ x 5	850
35	E-B, 12-20, AA	Emmerson, Brantingham Co., Rockford, Ill	12	20	3	24	2600	4355	.....	Wh.	54	Own	4 Ver.	4¾ x 5	900
36	E-B, 20-35		20	35	5	28	3300	9700	.....	Wh.	72	Own	4 Ver.	5¼ x 7	750
37	E-B, Reeves		40	65	8-10	44	10000	22750	.....	Wh.	90	Spec.	4 Ver.	7¼ x 9	500
38	Fitch, 4	Four-Drive Trac. Co., Big Rapids, Mich	20	35	3-4	28x30	3200	6000	3,300	Wh.	42	Clim.	4 Ver.	5 x 6½	850
39	Flour City, Jr		14	24	3	24	.....	.....	.....	.....	60	Own	4 Ver.	5 x 5	800
40	Flour City	Kinnard & Sons Mfg. Co., Minneapolis, Minn	20	35	4-5	28	.....	10000	.....	.....	72	Own	4 Ver.	5¼ x 6	800
41	Flour City		30	50	6-8	30	.....	14000	.....	.....	84	Own	4 Ver.	6¼ x 7	550-600
42	Flour City		40	70	8-10	36	.....	21000	.....	.....	96	Own	4 Ver.	7½ x 9	450-500
43	Fordson	Ford Motor Co., Highland Park, Mich	....	20	2	20x34	1800	2700	850	Wh.	42	Own	4 Ver.	4 x 5	1000
44															
45	Franklin Flexible, B	Franklin Trac. Co., Greenville, Ind	15	30	2-3	22x36	2500	3500	1,695	Cr.	None	Erd.	4 Ver.	4¼ x 6	1000
46	Frick	Frick Co., Waynesboro, Pa	12	24	3	22x26	.....	5800	.....	Wh.	60	Erd.	4 Ver.	4 x 6	900-1000
47	Frick		15	28	3-4	26	.....	6000	.....	Wh.	60	Beav.	4 Ver.	4¾ x 6	900-1000
48	Full Jewel	Lauson, John Mfg Co., New Holstein, Wis	15	30	3-4	24x30	3000	6500	2,285	Wh.	54	Beav.	4 Ver.	4¾ x 6	950
49	G-O	General Ordnance Co., Cedar Rapids, Ia	14	28	3	28	.....	4200	1,485	Wh.	46	Wauk.	4 Ver.	4½ x 5¾	1000
50	Grain Belt, 18-36	Grain Belt Mfg. Co., Fargo, N. D	18	36	4	24	.....	6800	2,500	.....	60	Wauk.	4 Ver.	4¾ x 6¾	900
51	Gray	Gray Tractor Co, Minneapolis, Minn	18	36	4	.....	2700	6185	.....	.....	54	Wauk.	4 Ver.	4¾ x 6¾	850
52	Hart-Parr, 30	Hart-Parr Co., Charles City, Ia	....	30	3	26	3000	5570	1,495	Wh.	52	Own	2 Hor.	6½ x 7	750
53															
54	Heider, C	Rock Island Plow Co., Rock Island, Ill	12	20	3	24	2000	6000	.....	Wh.	57	Wauk.	4 Ver.	4½ x 6¾	900
55															
56	Holton, 2-A	Holton Tractor Co., Indianapolis, Ind	10	16	2-12	.....	.....	2500	1,250	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1250
57	Huber, 12-25	Huber Mfg. Co., Marion, Ohio	12	25	3	24x42	2400	5000	.....	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
58	Illinois	Illinois Tractor Co., Bloomington, Ill	18	30	4	24x28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x 6½	800
59	International	International Harvester Co., Chicago	15	30	4	.....	2500	8990	.....	Wh.	66	Own	4 Hor.	5¼ x 8	575
60	J. T., N	J. T. Tractor Co., Cleveland, Ohio	16	30	3	30	3200	7300	2,800	Cr.	48	Chief	4 Ver.	4¾ x 6	1000
61	Kardell Utility	Kardell Trac. & Tr. Co., St. Louis, Mo	10	20	2	.....	.....	3500	1,350	.....	.....	Wis.	4 Ver.	4 x 5	1200
62	Keck-Gonnerman, C	Keck Gonnerman Co., Mt. Vernon, Ind	15	30	3	24x40	2500	6500	1,500	Wh.	60	Own	2 Hor.	7¼ x 8	650
63	Klumb, F	Dubuque Trac. & Tr. Mfg. Co., Dubuque, Ia	16	32	3	28	3200	525)	.....	Wh.	45	Clim.	4 Ver.	5 x 6½	800
64	La Crosse, G	La Crosse Trac. Co., La Crosse, Wis	12	24	3	24	2000	4000	945	Wh.	56	Own	2 Hor.	6 x 7	900
65	Leader, B		12	24	2	20	2000	5200	.....	.....	48	Own	2 Hor.	6¼ x 6	800
66	Leader, N	Dayton-Dowd Co., Quincy, Ill	16	32	3-4	28	3500	5800	2,150	Wh.	54	Clim.	4 Ver.	5 x 6½	800
67	Leader, C		18	36	3-4	28	4000	6500	2,650	Cr.	.....	Twin	4 Ver.	5 x 7½	750
68	Leader, D		20	40	4-5	28	5000	6500	3,150	Cr	.....	Doman	4 Ver.	6 x 7	750
69	Liberty	Liberty Tractor Co., Minneapolis, Minn	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x 6½	850
70	Magnet, B-14-28	Magnet Tractor Co., Minneapolis, Minn	14	28	3	24	2600	4500	1,850	Wh.	48	Wauk.	4 Ver.	4½ x 6¼	900
71	Mobile	Mobile Tractor Co., Mobile, Ala	12	24	2	26	2000	3400	1,450	Wh.	40	Herc.	4 Ver.	4 x 5⅛	1000
72	Moline Universal	Moline Plow Co., Moline, Ill	9	18	2	24	2000	3380	.....	Wh.	44	Own	4 Ver.	3½ x 5	.....
73	Monarch	General Tractors, Inc., Chicago	18	30	4	28	3300	8000	2,700	Cr.	.....	Beav.	4 Ver.	4¾ x 6	900

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain, Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

and Their Technical Specifications

Line Number	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
1	G-K	1½-King.	Ben.	Opt.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2	2.3-2.8	2.8	.....	In.	Yes	1
2	K	1½-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt	.....	Own	13½	800	3800	3	1⅞-3¾	2½	B. G.	In.	.....	2
3	G-K	1¼-Scheb.	Ben.	Bosch	B. & B.	Nutt	Sl. G.	Perfex	Hyatt	Own	Hyatt	7½	825	2600	2	2¼-3½	.....	I. G.	.....	Yes	3
4	G-K-D	1⅜-King.	Ben.	Eise.	Own	Own	Sl. G.	.....	Hyatt	Own	Hyatt	20	450	2400	1	2.2-2.49	2.5	I. G.	.....	Yes	4
5																					5
6	G-K	1¼-Ben.	Ben.	Eise.	B. & B.	Own	Sl. G.	McCord	Opt.	Timk.	Timk.	10	906	2600	2	2¼-4	2¼	I. G.	In	Yes	6
7	G-K-D	2 -King.	.....	Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	.....	1-2.93	2.13	B. G.	.....	No	7
8	G-K-D	2½-King.	.....	Eise.	Own	Own	.....	Own	Own	Own	Own	24	500	3150	2.2	1-2.2	2.2	B. G.	.....	No	8
9																					9
10	G-K-D-A	1¼-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	17½	600	2750	2	1¾-3	1¾	S. G.	Op.	.....	10
11	G-K-D	1½-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	19½	600	2910	2	1¾-2¾	1¾	S. G.	Op.	.....	11
12	G-K-D	1¼-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	.....	Own	16	700	2930	2	2½-3½	2	S. G.	Op.	.....	12
13	G-K-D	1½-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	18	650	3065	2	2-3	2	S. G.	Op.	.....	13
14																					14
15	G-K-D	2 -King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	22	600	2880	2	2-3	2	S. G.	Op.	.....	15
16																					16
17	G-K-D	2 -King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	26	500	3400	2	1¾-2½	1¾	S. G.	Op.	.....	17
18	G	1¼-King.	R. W.	Split.	Delt.	Own	Sel.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1¼-6	2½	D. R.	In.	Yes	18
19	G-K	1¼-King.	Ben.	King.	Twin	Own	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	.....	421	.....	2	2-3	2½	Ch.	In.	Yes	19
20	G-K-D	1½-King.	Donald.	K-W	.....	.....	.....	.....	.....	.....	Hyatt	12	750	.....	1	2.4-2¾	2.4	B. G.	.....	.....	20
21	K	1½-Scheb.	Ben.	K-W	Own	Own	Sl. G.	Eureka	.....	Own	Own	13	700	2600	2	2-3	3	I. G.	In.	Yes	21
22	G-K-D	1½-King.	Own	Berl.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14¼	1050	3731	2	2¼-3½	2¼	S. G.	In.	No	22
23	G-K-D	1⅜-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	16	900	3762	2	2¼-3	2¼	S. G.	In.	No	23
24	G-K-D	2 -King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt / Timk.	Timk.	Hyatt	16½	850	3669	2	2.2-3.2	2.2	S. G.	In.	No	24
25																					25
26	G	1½-Scheb.	Donald.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1012	3150	3	1.5-5.7	3	G	In.	No	26
27	G	2 -King.	Donald.	K-W	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	14	850	3120	3	1.65-4.78	3	G.	In.	No	27
28	G-K-D	1½-King.	R. & B.	Teagle	B. & B.	Own	Sl. G.	McCord	.....	.....	Timk.	8	1265	2500	1	1-3½	3	I. G.	In.	.....	28
29	G-K	1½-Ben.	Ben.	Dixie	Own	Own	Sl. G.	Own	Opt.	Own	Own	14	750	2750	2	2-3	3	Worm	.....	.....	29
30	K	1¼-Linga.	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Ch.	.....	Yes	30
31	G	1½-King.	Donald.	Bosch	B. & B.	Cotta	Sl. G.	Eureka	S. K. F.	Hyatt	Hyatt	.....	.....	.....	3	1-5	3	Ch.	.....	.....	31
32	G-K	1½-Scheb.	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2-3	1½	2	G.	.....	Yes	32
33	G-K	1¾-Scheb.	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2-3	1½	2	G.	.....	Yes	33
34	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	12	800	2225	3	1⅞-3.64	.....	B. G.	Op.	Yes.	34
35	K	1½-Strom.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	12	900	2800	2	2.01-2.78	2.78	I. G.	In.	No	35
36	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	597	2500	2	1.81-2.33	2.33	G.	Op.	No	36
37	K	2½-King.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	22	500	2880	1	2	.....	G.	Op.	.....	37
38	K	1½-King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl.	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	¾-4	2½	.....	.....	No	38
39	G-K	1½-Scheb.	.....	K-W	Own	Own	.....	Long	Hyatt	.....	.....	26	320	.....	2	2¼-3¼	2¼	G.	.....	.....	39
40	G-K	1½-Scheb.	.....	K-W	Own	.....	Sel.	Long	.....	.....	.....	26	350	.....	2	2¼-3	2¼	G.	.....	.....	40
41	G-K	2 -Scheb.	.....	K-W	Own	.....	.....	Long	.....	.....	.....	32	275	.....	1	.....	2½	G.	.....	.....	41
42	G-K	2½-Scheb.	.....	K-W	Own	.....	.....	Long	.....	.....	.....	34	275	.....	1	.....	2½	G.	.....	.....	42
43	K	-Holl.	Own	Own	Own	Own	Sel.	Own	Gurney / S. R. B.	Timk.	Gurney / S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....	43
44																					44
45	G-K	1¼-King.	Ben.	Eise.	B. & B.	Own	St. G.	McCord	N. D.	Timk.	Timk.	10	1000	2618	3	2-3-4	3	B. G.	In.	None	45
46	K	-King.	Ben.	King.	Own	Nutt	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	46
47	K	-Ben.	Ben.	Dixie	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	47
48	K	1¼-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk.	Hyatt	18	475	2200	2	1½-2½	2½	G.	In.	.....	48
49	G-K	1¼-King.	Ben.	Eise.	.....	Own	C. M.	Perfex	S. K. F.	.....	.....	10	970	.....	6	1¾-3	2½	S. G.	In.	No	49
50	G-K	-Strom.	Own	Dixie	Own	Own	Own	Own	Hyatt	Own	Own	14	.....	.....	2	.....	2½	S. G.	.....	.....	50
51	G-K	1½-Ben.	Ben.	Bosch	Own	Own	.....	S-J	Hyatt	.....	Hyatt	11⅝	850	2900	2	2½	2¾	Ch.	In.	Yes	51
52	K	K-Shunt	Own	K-W	Own	Own	Sl. G.	S-J	S. K. F. / Hyatt	Own	Own	14	750	2750	2	2-3	3	I. G.	Op.	Yes	52
53																					53
54	G-K	1¼-King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	14	400-900	2200	7	1-5	2¼	B. G.	Op.	Yes	54
55																					55
56	G	⅜-King.	Ben.	Eise.	Detl.	Covert	Sl. G.	Perfex	.....	.....	.....	6	1250	1963	3	¾-4	2½	I. G.	.....	Yes	56
57	G-K	¼-King.	Ben.	King.	Own	Own	Sel.	Perfex	G. & H.	Own	Own	13	1000	.....	2	2.43-3.75	2.43	S. G.	Op	Yes	57
58	K	1½-Strom.	Ben.	Dixie	Twin	Foote	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2½-3.4	2½	S. G.	In.	Yes	58
59	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2⅞	2⅞	Ch.	.....	.....	59
60	K	1½-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Timk.	Hyatt	Hyatt	10	1000	2600	3	1¼-5	2½	S. G.	In.	No	60
61	G	1-Carter	Ben.	Dixie	Detl.	Own	Sel.	Eureka	Hyatt	Timk.	Gurney	10	1200	3100	2	2¼-4	3	S. G.	In	Yes	61
62	K	2-Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own	S.K.F.	Own	Own	11½	650	.....	3	2½-3½	3	S. G.	In.	Yes	62
63	K	1½-Strom.	Ben.	Dixie	Own	Own	C. M.	Hooven	Hyatt	Hyatt	Hyatt	14	800	2600	2	2½-4	2½	.....	In.	.....	63
64	K	1½-King.	Ben.	.....	Own	Own	.....	Long	Hyatt	Hyatt	Hyatt	7x11	750	2600	1	2-2¾	2½	.....	.....	Yes	64
65	K	1½-King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2¼-3½	2¼	I. G.	Op.	.....	65
66	K	1½-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Own	Opt.	Hyatt	Hyatt	14	800	2900	.....	.....	3½	I. G.	In.	.....	66
67	K-D	1¾-King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Ch.	Op.	.....	67
68	G-K-D	1½-Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Ch.	Op.	.....	68
69	G-K	1½-Strom.	Ben.	Dixie	Bier.	Own	.....	S-J	Hyatt	Own	Own	12	900	2825	2	2½-5	2½	S. G.	In.	Yes	69
70	G-K	1½-Strom.	Ben.	Berl.	B. & B.	Own	Sl. G.	S-J	N. D.	N. D.	Opt.	14	700	2600	3	1¼-8	2¾	Worm	.....	Yes	70
71	G-K-D	1¾-King	Ben.	Eise.	B. & B.	Spec.	Sl. G.	McCord	.....	Timk.	Timk.	8x12	995	2600	2	2¼-4	2¼	I. G.	In.	Yes	71
72	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	.....	1	½-3	3½	G.	In.	.....	72
73	G-K-D	1½-King.	Ben.	K-W	M. & E.	Own	Sl. G.	Perfex	.....	.....	.....	16	600	2600	3	1½-3½	2¼	Ch.	.....	.....	73

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Ruff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain, Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

Motor Age Monthly Guide to Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
74	Oil-Gas, 18-36		18	36	4	30x46	.....	13500	.....	Wh.	64	Own	2 Hor.	8 x 10	400–450
75	Oil-Gas, 25-50	Nichols & Shepard Co., Battle Creek, Mich.	25	50	6	32x52	.....	19000	.....	Wh.	69	Own	2 Hor.	9 x 12	350–420
76	Oil-Gas, 35-70		35	70	8–10	40x60	.....	30000	.....	Wh.	73	Own	2 Hor.	10½ x 14	300–375
77	Oil-Pull		12	20	3	22x36	2150	6682	.....	Wh	51	Own	2 Hor	6 x 8	360
78	Oil-Pull	Advance-Rumely Thresher Co., Laporte, Ind.	16	30	4	28x44	2850	9600	.....	Wh.	56	Own	2 Hor.	7 x 8½	530
79	Oil-Pull		20	40	5–6	32x52	3750	12820	.....	Wh.	64	Own	2 Hor.	8 x 10	450
80	Oil-Pull		30	60	8–10	36x60	5900	26700	.....	Wh.	80	Own	2 Hor.	10 x 12	375
81	Oliver, B	Oliver Tractor Co., Knoxville, Tenn	15	30	3–4	32	2800	7700	.....	.....	.....	Beav.	4 Ver.	4½ x 6	900
82	One-Man	Reed Fdy. & Mach. Co., Kalamazoo, Mich.	12	25	3	22x24	.....	5000	1,685	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
83	Parrett, H	Parrett Tractor Co., Chicago Heights, Ill.	12	25	3	.....	2800	5225	.....	Wh.	60	Buda	4 Ver.	4¼ x 5½	1000
84	Parrett, K		15	30	3	.....	.....	5250	1,950	Wh.	60	Own	4 Ver.	4½ x 6	1000
85	Peoria, J	Peoria Tractor Corp., Peoria, Ill.	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver.	5 x 6½	800
86	Pioneer, 18-36	Pioneer Tractor Co., Winona, Minn.	18	36	4	28	4000	6100	.....	.....	60	Own	4 Hor.	5½ x 6	750
87	Pioneer, 30		30	60	10	36	8000	24000	.....	.....	96	Own	4 Hor.	7 x 8	650
88	Plow Man, 15-30	Plow Man Tractor Co., Waterloo, Ia.	15	30	3–4	30	3000	5100	1,995	Wh.	60	Buda	4 Ver.	4½x 6	1000
89	Port Huron, 12-25	Port Huron Eng. & T. Co., Port Huron, Mich.	12	25	3	22x38	2250	5900	1,700	Wh.	56	Chief	4 Ver.	4¾ x 6	900
90															
91	Post, D	Post Tractor Co., Cleveland, Ohio	12	20	2	.....	.....	4300	.....	Wh.	32	Wauk.	4 Ver.	4¼ x 5¾	800
92	Russell, Junior		12	24	2	18	2000	6200	.....	Wh.	53	Wauk.	4 Ver.	4½ x 5¾	1000
93	Russell, Little Boss	Russell & Co., Massillon, Ohio	15	30	3	24	3000	6900	.....	Wh.	53	Wauk.	4 Ver.	4½ x 6¾	950
94	Russell, Big Boss		20	35	4	30	4000	7600	.....	Wh.	60	Model	4 Ver.	5½ x 7	825
95	Russell, Giant		30	60	8	40	6000	24000	.....	Wh.	84	Own	4 Ver.	8 x 10	525
96	Samson, D	Samson Tractor Co., Janesville, Wis.	.....	.....	1	.....	.....	.....	630	Wh.	.....	.....	4 Ver.	.....	.....
97	Samson, M		.....	.....	2	20x32	.....	.....	840	Wh.	.....	.....	4 Ver.	.....	.....
98	Sandusky, J		10	20	3	22	2000	4080	1,)	Wh.	48	Own	4 Ver.	4¼ x 5¼	1050
99		Dauch Mfg. Co., Sandusky, Ohio													
100	Sandusky, E		15	35	4	30	3000	7670	1,750	Wh.	56	Own	4 Ver.	5 x 6½	750
101	Shelby, D	Shelby Trac. & Tr. Co., Shelby, Ohio	15	30	3	.....	.....	4600	.....	Wh.	48	Spec.	4 Ver.	4¾ x 6	900
102	Short Turn, D	Short Turn Tractor Co., Minneapolis, Minn.	20	40	3	24	.....	5000	1,500	Wh.	65	.....	4 Ver.	4¾ x 6	950
103															
104															
105	Simplicity	Turner Mfg. Co., Pt. Washington, Wis.	14	25	3	24	2600	4300	1,695	Wh.	54	Buda	4 Ver.	4¼ x 5½	1000
106	Square Turn, A	Square Turn Tractor Co., Norfolk, Nebr.	18	35	3	28	3200	7400	.....	.....	60	Clim.	4 Ver.	5 x 6½	850
107	Steel Mule	Bates Mach. & Trac. Co , Joliet, Ill.	15	22	3	26x36	.....	4600	.....	Cr.	.....	Erd	4 Ver.	4¼ x 6	900
108	Stinson, 4-E	Stinson Trac. Co., Superior, Wis.	18	36	4	28x30	.....	7100	2,250	Wh.	60	Beav.	4 Ver.	4¾ x 6	950
109	Tioga, 3	Tioga Mfg. Co., Philadelphia, Pa.	15	27	3–4	.....	.....	4950	.....	Wh.	36	Wis.	4 Ver.	4½ x 6	1000
110	Titan	International Harvester Co., Chicago	10	20	3	.....	1800	5710	.....	Wh.	54	Own	2 Hor.	6½ x 8	575
111	Topp-Stewart, B	Topp-Stewart Trac. Co., Clintonville, Wis.	30	45	4–6	.....	7600	7500	3,500	Wh.	42	Wauk.	4 Ver.	4¾ x 6¾	900
112	Tracklayer, B	C. L. Best Gas Trac. Co., San Leandro, Calif.	12	25	3	.....	2000	5100	2,600	Cr.	.....	Own	4 Ver.	4⅝ x 5¼	850
113															
114	Tracklayer, A		35	60	9	.....	6500	17500	5,750	Cr.	.....	Own	4 Ver.	6½ x 3½	650
115															
116	Trundaar, 10	Buckeye Mfg. Co., Anderson, Ind.	25	40	4	.....	3750	8800	3,750	Ch. T.	.....	Wauk.	4 Ver.	5 x 6¼	900
117	Twin City, 12-20		12	20	3	20x24	2000	4200	.....	Wh.	50	Own	4 Ver.	4¼ x 6	1000
118	Twin City, 16-30		16	30	4	24x28	3000	7800	.....	Wh.	54	Own	4 Ver.	5 x 7½	650
119	Twin City, 25-45	Minneapolis Steel & Machinery Co., Minneapolis.	25	45	6	32x34	6700	16000	.....	Wh.	76	Own	4 Ver.	6¼ x 8	600
120	Twin City, 40-65	Minn.	40	65	8	40	7500	23700	.....	Wh.	84	Own	4 Ver.	7¼ x 9	535
121	Twin City, 60-90		60	90	12	40	11250	28000	.....	Wh.	84	Own	6 Ver.	7¼ x 9	535
122	Uncle Sam, B-19	U. S. Trac. & Machy. Co., Menasha, Wis.	20	30	3	28	3000	4250	.....	Wh.	50	Beav.	4 Ver.	4¾ x 6	900
123	Victory, 15-30	Victory Tractor Co., Greensburg, Ind.	15	30	3	28	2500	3450	1,750	Wh.	48	Wauk.	4 Ver.	4¼ x 5¾	900
124	Vim	Vim Tractor Co., Schleisingerville, Wis.	10	29	2–3	24	1800	3500	1,650	Wh.	48	Wauk.	4 Ver.	3¾ x 5¼	1050
125															
126	Wallis, K	J. I. Case Plow Works Co., Racine, Wis.	10	25	3	24x40	2600	3560	.....	Wh.	48	Own	4 Ver.	4¼ x 5¾	900
127	Waterloo Boy, N	Waterloo Gasoline Eng. Co., Waterloo, Ia.	12	25	3	.....	2000	5900	.....	Wh.	52	Own	2 Hor.	6½ x 7	750
128	Wetmore	Wetmore, H. A., Sioux City, Ia.	12	25	2–3	22	.....	2900	1,485	Wh.	46	Wauk.	4 Ver.	4 x 5¾	960
129	Wisconsin, E	Wisconsin Farm Trac. Co., Sauk City, Wis.	16	30	3–4	28	3500	5440	.....	Wh.	52	Clim.	4 Ver.	5 x 6½	800
130	Yuba, Ball Tread	Yuba Mfg. Co., Marysville, Calif.	12	20	3	.....	3500	7000	2,945	Cr.	.....	Wauk.	4 Ver.	4½ x 6¾	700
131	Yuba, Ball Tread		20	35	6–7	.....	6000	10100	4,892	Cr.	.....	Wis.	4 Ver.	5¾ x 7	700

One and Two-Horse Tractors

132	Avery, 5-10 B	Avery Co., Peoria, Ill.	5	10	2	22x32	900	2600	.....	Wh.	38	Own	4 Ver.	3 x 4	1200
133	General Purpose	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	6	12	1-16	.....	1000	2500	795	Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1000
134	Heider, D	Rock Island Plow Co., Rock Island, Ill.	9	16	2	20	1500	4000	.....	Wh.	54	Wauk.	4 Ver.	4¼ x 5¾	1000
135															
136	Indiana	Indiana Silo Co., Anderson, Ind.	5	10	1	.....	900	2000	.....	Wh.	50	Le Roi	4 Ver.	3⅛ x 4½	950
137	International	International Harvester Co., Chicago	8	16	2	.....	1350	3600	.....	Wh.	40	Own	4 Ver.	4¼ x 5	1000
138	La Crosse, M	La Crosse Trac. Co., La Crosse, Wis.	7	12	1-16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
139	Shawnee	Shaw Enochs Trac. Co., Minneapolis, Minn.	9	18	2	22	2100	3800	.....	Wh.	48	Gray	4 Ver.	3½ x 5	1400
140	Shelby, C	Shelby Trac. & Tr. Co., Shelby, Ohio	9	18	2	22	.....	3500	.....	Wh.	42	Wauk.	4 Ver.	3¾ x 5¼	1000
141	Traylor 6-12	Traylor Engrg. & Mfg. Co., Cornwells, Pa.	6	12	1	.....	.....	1700	815	Wh.	38	Le Roi	4 Ver.	3⅛ x 4½	1000
142	Victory, 9-18	Victory Tractor Co., Greensburg, Ind.	9	18	2	20	1500	3300	1,385	Wh.	48	Gray	4 Ver.	3½ x 5	1000

Abbreviations: **Traction**—wh. wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic Weid. Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruton., Rutonber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign, Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain. Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Else., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

and Their Technical Specifications

Line Number	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
74	K	-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Own	Own	Own	8x22	.....	.....	2	1½-3	1½-3	S. G.	.....	.....	74
75	K	2½-King.	.....	Wied.	Own	Own	Sl. G.	Perfex.	Own	Own	Own	9x24	.....	.....	1	2.1	2.1	S. G.	.....	.....	75
76	K	3 -King.	.....	Wied.	Own	Own	Sl. G.	Perfex	Own	Own	Own	12x30	.....	.....	1	1.86	1.86	S. G.	.....	.....	76
77	K-D	2¼-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	560	2790	2	2.1-3.26	2.1	S. G.	Op.	No	77
78	K-D	2½-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1-3	2.1	S. G.	Op.	No	78
79	K-D	2¾-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	450	3060	2	2-3.2	2	S. G.	Op.	No	79
80	K-D	3¼-Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	S. G.	Op.	No	80
81	G-K	1½-Ben.	Ben.	Dixie	.....	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	21½	2600	450	2	1¾-2½	2½	S. G.	.....	.....	81
82	G-K	1¼-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14½	2600	703	2½-3½	.....	2½	B. G.	In.	Yes	82
83	K	1¼ King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Hyatt	Hyatt	12	1000	3141	3	1.80-4	.....	I. G.	In.	.....	83
84	G-K	1⅜-King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Own	Own	12	1000	3100	2	2.6-4.07	2¾	S. G.	.....	Yes	84
85	K	1½-Strom	Ben.	Eise.	Own	Nutt.	Sl. G.	Eureka	Hyatt	.....	.....	14	650	2500	2	2½-4	2½	I. G.	.....	Yes	85
86	G-K	1½-King.	Ben.	K-W	Own	Own	.....	S-J	Timk.	Timk.	Timk.	14	750	.....	3	1¾-4	2½	S. G.	.....	.....	86
87	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17½	650	.....	3	1¾-4¼	2½	.....	.....	.....	87
88	G-K	1¼-Strom.	.....	Dixie	Own	Foote	Sl. G.	Perfex	Hvatt	Hyatt	Hyatt	14	590	2200	2	2-3	.....	I. G.	Op.	.....	88
89	G-K	1⅜-King.	Own	Eise.	Own	Own	.....	Bremer	S. K. F.	Plain	Plain	14	650-1065	2380-3900	7	1⅞-4	2	S. G.	In.	Yes	89
90																					90
91	G-K	-King.	Ben.	Split.	Own	Own	.....	Perfex	Opt.	Timk.	Timk.	14	2500	.....	2	3-3	3	G	.....	Yes	91
92	K	1¼-King.	Ben.	Bosch	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	915	3000	3	1½-3¾	2¼	S. G.	Op.	.....	92
93	K	1¼-King.	Ben.	Dixie	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	810	2850	3	1½-3¾	2¼	S. G.	Op.	.....	93
94	K	1½-King.	Ben.	Dixie	Own	Own	Sl. G.	.....	.....	.....	.....	12½	840	2749	2	2.4-3¾	2.4	S. G.	Op.	.....	94
95	K	2 -King.	Ben.	Bosch	Own	Own	Sl. G.	.....	.....	.....	.....	24	525	3310	2	2-4½	2	S. G.	Op.	.....	95
96	G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	96
97	G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	375	.....	2	.....	.....	.....	.....	.....	97
98	G K-D	1¼-King.	Ben.	Dixie	Own	Own	Sel.	Perfex	Hyatt N. D.	Own	Own	10	1000	2600	2	2-3	2	I. G.	Op.	Yes	98
99																					99
100	G-K-D	2 -King.	Ben.	Dixie	Own	Own	Sel.	C. & P.	Own	Own	Own	15	800	2950	3	2-5½	2	I. G.	Op.	No	100
101	G-K	-King.	Ben.	Dixie	Own	Foote	Sl. G.	Modine	Hyatt	Timk.	Hyatt	14	650	.....	2	2½-3½	3	I. G.	In.	Yes	101
102	G-K	1½-Opt.	Opt.	Dixie	.....	Own	Sel.	Splitex	Own	Own	Own	18	950 700 490	.....	2	2-3	2½-3	I. G.	.....	Yes	102
103																					103
104																					104
105	G-K	1¼-King.	Ben.	Dixie	Own	Own	.....	Perfex	Hyatt	Own	Own	14	600	600	2-2½	1¾-3	2½	.....	.....	Yes	105
106	G-K	1½-Strom.	Ben.	Dixie	.....	Own	.....	Modine	Hyatt	Hyatt	Hyatt	12	850	2669	1	2½	2½	I. G.	.....	Yes	106
107	G-K-D	1¼-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	Modine	Timk.	Timk.	Timk.	12	750	2300	2	2.33-3.5	2.33	S. G.	.....	.....	107
108	K	1⅜-King.	Rain.	Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950	2985	1	2½-3	3	S. G.	In.	Yes	108
109	G	1¼-Strom.	Ben.	Split.	Twin	Own	Sel.	G. & O.	Gurney	Timk.	Opt.	12	.....	.....	2	2.7-3.7	2.7	G.	In.	No	109
110	G-..-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2⅞	2⅞	Ch.	.....	.....	110
111	G	1½-Strom.	Ben.	Ei e.	B. & B.	Own	Sel.	Bremer	Hyatt	N. D.	N. D.	12	900	2600	3	1¾-4½	2¼	I. G.	.....	.....	111
112	D	1½-Ens.	Ben.	Split.	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Hyatt	9	9000	1971	2	2¼-3	3	I. G.	.....	.....	112
113																					113
114	D	2 -Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Timk.	16	650	2720	2	3-2	3	I. G.	.....	.....	114
115																					115
116	G-K-D	-Strom.	Own	Bosch	Hill.	Own	Sl. G.	Modine	Opt.	.....	H. & T.	.....	900	2600	2	1.3-2.5	.....	S. G.	In.	.....	116
117	G-D	1¼-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	650	2700	2	2.2-2.9	2.9	S. G.	In.	Yes	117
118	G-K	1½-Holl.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	17	528	2350	2	2-2.75	2¾	S. G.	In.	.....	118
119	G-K	2 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	2	1.4-2	2	S. G.	Op.	.....	119
120	G-K	2½-King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	200	1	2	2	G.	Op.	.....	120
121	G-K	3 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S.	Op.	.....	121
122	K	1½-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	Yes	122
123	G	1¼-Ben.	Ben.	Berl.	B. & B.	Own	Sl. G.	James.	Schatz	Hyatt	Opt.	10	800	2600	2	1¾-4	2½	S. G.	.....	.....	123
124	G-K	-Ben.	Par.	Simms.	B. & B.	Own	S . G.	B. & W.	Gurney	Gurney Hyatt	Hyatt	10	1050	2300	2	2½-3½	2½	I. G.	In.	Yes	124
125																					25
126	G-K-D	1¼-Ben.	Ben.	Berl.	Twin	Own	Sl. G.	Modine	Timk.	Hyatt	Timk.	18	430	.....	2	1½-3½	2½-3½	S. G.	.....	.....	126
127	K	1½-Scheb.	.....	Dixie	Own	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14	750	2750	2¼-3	2¼-3	2¼-3	I. G.	Opt.	Yes	127
128	G	1¼-Scheb.	.....	Split.	Full.	Fuller	S. G.	Ideal	.....	.....	Timk.	12	900	.....	3	2-5	3½	I. G.	In.	Yes	128
129	K	1½-Strom	Ben.	Eise.	B. & B.	Fo te	S. G.	Perfex	Hyatt	.....	.....	16	600	2600	2	1½-4	2½	S. G	In.	.....	129
130	D	1¼-Ens.	Donald.	Bosch	B. & B.	Own	S. G.	Own	Hyatt	.....	Hyatt	12	700	2200	3	1.5-4	2.08	B. P.	.....	.....	130
131	D	-Strom.	Donald.	Bosch	Para.	Own	S. G.	Own	Hyatt	.....	Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.	.....	.....	131

One and Two-Horse Tractors

132	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	10	780	2450	3	1½-4¼	2½	S. G.	Op.	.....	132
133	G	⅞-King.	Ben.	.....	B. & B.	Own	Sl. G.	Own	Gurney	Own	Own	10	1000	2600	1	1½-2.4	2.4	.....	.....	Yes	133
134	G-K	1 -King.	Ben	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	12	400-1000	2200	7	1-5	1¼	B. G.	Op.	Yes	134
135																					135
136	K	⅞-King.	Ben.	A-K	Own	Own	Sl. G.	Cand.	.....	.....	.....	.....	1200	.....	1¼-4	.....	.....	Ch.	Op.	.....	136
137	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G.	B. & L.	Own	Own	.....	12¼	625	.....	.....	1¾-4.1	2¾	Ch.	.....	.....	137
138	K	1¼-King.	Ben.	.....	Own	Own	Own	Hopper	.....	Own	Own	10	1000	2600	1	1¾-2½	2½	.....	.....	Yes	138
139	G	1 -Scheb.	Ben.	Berl.	B. & B.	Own	.....	Todd	Fafnir	.....	Hyatt	8	.....	2600	2	1¾-2.4	2.4	.....	In.	Yes	139
140	G	1 -King.	Ben.	Dixie	Full.	Full.	Sl. G.	Modine	.....	Timk.	Timk.	10	850	2200	3	1¾-4¾	.....	I. G	In.	.....	140
141	G	-King	Own	Dixie	B. & B	Own	Sl. G.	G. & O.	Own	Own	.....	8	1200	1000	1	3½-5	3½	B. G.	.....	.....	141
142	G	1 -Car.	Ben.	Berl.	B. & B.	Own	Sl. G.	James.	Schatz	Hyatt	Opt.	10	820	2650	2	1¾-4¼	2½	S. G.	.....	.....	142

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Bear., Bearer; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weld., Weldely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain, Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

Motor Age Monthly Guide to Tractors

Orchard Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
143	Allwork	Electric Wheel Co., Quincy, Ill.													
144	Avery, 6-cyl.	Avery Co., Peoria, Ill.				22x32		3164		Wh.	38	Own	6 Ver.	3 x 4	1200
145	Cletrac, W	Cleveland Trac. Co., Cleveland, Ohio	12	20	2	24x40	1500	3400	1,395	Cr.		Own	4 Ver.	4 x 5½	1265
146	Fageol, D	Fageol Motors Co., Oakland, Calif.	9	12	2		1450	3500	1,525		48	Lyc.	4 Ver.	3½ x 5	1250
147	Fordson	Ford Motor Co., Highland Park, Mich.		20	2	20x34	1800	2700	850	Wh.	42	Own	4 Ver.	4 x 5	1000
148															
149	International, 8-16	International Harvester Co., Chicago	8	16	2		1350	3600		Wh.	40	Own	4 Ver.	4¼ x 5	1000
150	Moline Orchard	Moline Plow Co., Moline, Ill.	9	18	2	24	2000	3380		Wh.	44	Own	4 Ver.	3½ x 5	
151	Stockton, A	Stockton Trac. Co., Stockton, Calif.	8	16	2-3	20x34	1850	3150	1,225	Wh.	44	H-S	4 Ver.	3½ x 5	

Garden Tractors

152	Beeman, G	Beeman Tractor Co., Minneapolis, Minn.	2	4	1-7		260	550	310	Wh.	25	Own	1 Ver.	3½ x 4½	850
153	Do-It-All	Consolidated G. & Gas Eng. Co., New York	3	6	1			1000	495		24	Own	1 Ver.	4½ x 5	900
154	Market	Market Garden Trac. Co., Minneapolis, Minn.	2	4½	1-7			550			24	Veer.	1 Hor.	4 x 4	850
155	Merry Garden	Atlantic Mach. Mfg. Co., Cleveland, Ohio		2				250	195		20		1 Ver.	2¾ x 2½	900
156	New Britain, 1	New Britain Mch. Co., New Britain, Conn.	3	6	1-9		400	700	450	Wh.	26½	Own	2 Ver.	2¾ x 4	1500
157	New Britain, 2		3	6	1-9		400	750	500	Wh.	32	Own	2 Ver.	2¾ x 4	1500
158	Oldsmar	Oldsmar Tractor Co., Oldsmar, Fla.	1-3	5	1		150-450	1200	375	Wh.	32	Evin.	1 Ver.	5 x 5½	580
159	Princess Pat	Scientific Farming Mchy., Minneapolis, Minn.			2	24x26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4¼ x 5½	1000
160	Tillermobile, A	Tillermobile Co., Minneapolis, Minn.	2	6	1-8			625	385	Wh.	30	Veer.	1 Ver.	4 x 4	1200
161	Universal, 20	Elderfield Mechanics Co., Pt. Washington, N. Y.	1	4	1		250	750	485		30	Own	1 Ver.	3½ x 5	1000
162	Utililitor	Midwest Engine Co., Indianapolis, Ind.	1½	3½	1		150-200	750	380	Wh.	24¾	Own	1 Ver.	3½ x 4½	1200

Motor Cultivators

163	Avery, Single Row	Avery Co., Peoria, Ill.	5	10			900	2650		Wh	42	Own	4 Ver.	3 x 4	1200
164	Avery, C							3450		Wh.	42	Own	6 Ver.	3 x	1200
165	Bailor, A	Bailor Plow Mfg. Co., Atchison, Kan.	6					2150	925	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
166	Bailor, W		6					1800	775	Wh.	40	Le Roi	4 Ver.	3⅛ x 4½	1000
167	Detroit Culto, AA	Detroit Culto-Tractor Corp., Detroit	9	16	2	20x28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
168	E-B	Emmerson-Brantingham Co., Rockford, Ill.			None			3200		Wh.	42	Le Roi	4 Ver.	3½ x 4½	100
169	Heider, 10	Rock Island Plow Co., Rock Island, Ill.	6	10	1			2700		Wh.	46	Le Roi	4 Ver.	3⅛ x 4½	
170	Parrett, J	Barrett Motor Corp., Chicago	6	12	2	None		3000	890	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
171	Shawnee	Shaw Eno ha Trac. Co., Minneapol's, Minn.	6	12	1		1100	2600		Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1400
172	Toro	Toro Motor Co., Minneapo is, Minn.	6				1100	2800	950	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1200

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Providing Owners With the Best Possible Service Facilities

Concluded from page 15.

the customers in these days of high labor cost. Especial attention has been given the machine and tools equipment. Each man has his own set of tools kept in his own drawer to which only he has the key and the only other person who can gain access is the owner by means of a master key. The conventional drop light and the inevitable greasy cord are minus. Overhead reels are used so that cushions are not soiled and when the repairman is finished with the light he has only to reel up the wire and the light is out of the way. The machine shop outfit includes lathes, arbor and drill presses, grinders, electric valve grinders which have proved a big time and money saver, revolving engine cradles which permit of working on engines from all positions and elevated channel steel runways which take the place of pits. These elevated runways permit the repairmen to get under the cars easily, provide plenty of head room and allow for easy access and also make for cleanliness. Traveling overhead chain hoists extend on both sides of the building full length and facilitate the removal and replacement of engines and transmissions.

For the manufacture of tools, fender irons and so on there is a full fledged blacksmith shop. There is also equipment for recharging storage batteries and while no attempt is made to do this sort of thing on a pretentious scale, the facilities at hand save time and money and speed up the service.

The Hine service department is remarkably clean, in fact cleanliness is a characteristic of the whole establishment. One man is kept busy in the repair department cleaning and setting things to rights with the result the department will stand inspection at any time.

The heavy parts department is located in the southwest wing of the basement directly beneath the light parts section and by means of a dumb waiter, parts are sent to the repair shop or to the light parts department. The basement also provides ample space for new car storage, coal bunkers, wash stands, water heaters and house heating apparatus. A freight elevator runs from the basement to the top story.

In the layout of the building A. C. Hine determined to have plenty of Nature's illumination and as above mentioned the building is well glassed on three sides. The steel sash is arranged for easy ventilation.

TRAVELING TRACTOR SCHOOLS

Concluded from page 13.

the field, learning to drive machines and set the plows so they will do the most effective work. Then the shop division moves along to the new place leaving the field division to complete the course. When the field division is on its way it has left behind a large number of trained

and Their Technical Specifications

Orchard Tractors

Line Number	Fue	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
143																					143
144	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	10	780	2450	3	1½-4¼	2½	S. G.	Op.	.....	144
145	G-K-D	1⅛-King.	Own	Teagle	Own	Own	Sl. G.	McCord	.....	Timk.	Timk.	8	1265	2500	1	1-3½	3	I. G.	In.	.....	145
146	G-K-D	1 -Zen.	Own	Dixie	Own	Own	C. M.	Modine	Timk.	Timk.	Timk.	8	1250	2600	1	¾-3	2½	S. G.	.....	.....	146
147	K	-Holl.	Own	Own	Own	Own	Sel.	Own	Gurney S. R. B.	Timk.	Gurney S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....	147
148																					148
149	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G.	B. & L.	Own	Own	.....	12¼	625	.....	.....	1¾-4.1	2¾	Ch.	.....	.....	149
150	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	.....	1	½-3	3½	G.	In.	.....	150
151	G-D	1 -King.	Ben.	Berl.	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	12	400	.....	2	2½-3½	2½	G.	In.	No	151

Garden Tractors

152	G	¾-King.	Donald.	Heinze	Own	Own	.....	S-J	.....	None	None	4½	850	900	1	¾-3	2	G.	.....	Yes	152
153	G	1 -Holl.	Donald.	Berl.	Own	Own	.....	Own	Own	Own	.....	6	.....	.....	1	1-3	2½	.....	.....	.....	153
154	G	1 -Scheb.	Ben.	Berl.	Own	Own	Spec.	.....	Hess-B.	Timk.	.....	6	2000	.....	1	1½-2½	2½	Worm	.....	.....	154
155	G	.....	.....	Evin.	Own	Own	Sl. G.	.....	Own	.....	Own	6	200	.....	1	1¾-2¼	.....	S. G.	.....	.....	155
156	G	¾-King.	Ben.	Dixie	Own	Own	.....	G. & O.	Own	.....	.....	5½	1500	2160	1	1-3	.....	B. G.	In.	.....	156
157	G	¾-King.	Ben.	Dixie	Own	Own	.....	G. & O.	Own	.....	.....	5½	1500	2160	1	1-3	.....	B. G.	In.	.....	157
158	G	1 -Scheb.	Own	Opt.	Own	.....	.....	None	Own	.....	.....	5	580	240	2½	.....	2½	.....	.....	.....	158
159	K	1¼-Ben.	Martain	Dixie	B. & B.	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2½-4½	2½	I. G.	In.	Yes	159
160	G-K	-Veer.	Own	Berl.	Own	Own	D. R.	.....	.....	.....	.....	11	.....	.....	1	1-3	2½	B. G.	.....	.....	160
161	G	⅞-Zen.	.....	Bosch	Own	Own	.....	Main	.....	.....	.....	6	1000	.....	1	1-3	2	Worm	.....	.....	161
162	G	¾-King.	Own	Eise.	Own	Own	.....	Modine	.....	.....	.....	4½	1200	1200	1	1-4	2¼	I. G.	In.	.....	162

Motor Cultivators

163	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G...	Own	Hyatt	Own	Hyatt	10	780	2450	3	1⅝-4⅜	2½	S. G.	Op.	.....	163
164	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	10	780	2450	3	1⅝-4¼	2½	S. G.	Op.	.....	164
165	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	12	.....	.....	2	2½-3.7	.....	Ch.	.....	.....	165
166	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	.....	.....	.....	2	2½-3.7	.....	Ch.	.....	.....	166
167	G	1¼-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	885	1800	2	1-3	2½	B. G.	In.	.....	167
168	G	-Holl.	Ben.	Dixie	Own	None	None	Perfex	Hyatt	Own	Hyatt	7½	995	.....	1-5	1½-3½	None	.....	.....	.....	168
169	G	⅞-King.	Ben.	Dixie	.....	.....	.....	Perfex	Opt.	.....	.....	.....	.....	.....	.....	1½-3½	.....	B. G.	Op.	.....	169
170	G	¾-King.	Own	Eise.	B. & B.	Own	Sel.	Modine	S. K. F.	Hyatt	Hyatt	6	1000	.....	2	1.3-3.5	.....	I. G.	.....	No	170
171	G	1 -Scheb.	Ben.	Berl.	B. & B.	Own	.....	Todd	Fafnir	.....	Hyatt	8	.....	2600	2	1¾-2.9	2.9	Worm	In.	Yes	171
172	G	⅞-King.	Ben.	Eise.	Own	Own	Sl. G.	B. & W.	Opt.	.....	Hyatt	8	1200	2400	2	1-3½	2.7	B. G.	In.	.....	172

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weld., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain., Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

men capable of intelligently driving and repairing farm engines.

Collins organized schools this year in all parts of California, most of them in the Sacramento and San Joaquin Valleys and in the thickly settled orchard district of the Santa Clara Valley. A more recent development which has come with the popularity of small engines is the need of orchard plots as a part of training fields, for the students must learn to plow close to trees and vines as well as in the open. It has been clearly demonstrated in the great fruit districts of California that a tractor can get closer to trees and do better work in orchards than horses can do.

In California the State Traveling Tractor School has largely taken the place of the big State demonstration which was a feature of the earlier development of the tractor industry. California has held some big demonstrations at Sacramento and Los Angeles, but the manufacturers and dealers will tell you now that the day of the big demonstration is past. It no longer is a matter of convincing the West Coast farmer that the tractor is practicable and this educational work was largely the purpose of the big demonstrations. The coast farmer knows it will do the work, for the sputter of farm work engines can be heard in every neighborhood, whether it be in the region of grain farming or strawberry culture. And the farmer has seen it do the work. Much could be written about the new things that have been discovered about tractors in the specialized farming country of the West, but that is another story.

"The Traveling Tractor School is the greatest thing for the industry, for the farmer and for the state, too, that has happened since the first engine started to work on the coast," said Collins with conviction. "We are behind the school to the limit and it is a permanent thing out here. You couldn't supply the demand for tractor drivers without such a school, and the country must have a constant stream of trained tractor driver recruits or go hungry. This school idea is one on which all factors have been able to get together and do valuable and necessary work. It is a case of each one helping the other fellow to the benefit of all—and that's the way to live in this little old world, after all."

ROLLS-ROYCE PRODUCTION—ONE A DAY

Springfield, Mass., July 27—The Rolls-Royce Co. factory which cost about $800,000, will be known as the Rolls-Royce Co. of America. The present plans call for an output of one car a day, and by the addition of more machinery, 1000 cars a year can be turned out without additional building. Forty of the best experts have been brought over from the Derby works to supervise the work in the new plant. The Springfield plant will turn out the same chassis, in every detail, as that made at Derby. It will sell at $11,000, and the body ordinarily used costs about $7,000.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Toronto, Exhibition City	National Automobile Show	Aug. 28-Sept. 11
Milwaukee	Annual Fall Automobile Show	Aug. 30-Sept. 4
Indianapolis	Fall Automobile Show	Sept. 6-11
Northampton, Mass.	Annual Automobile Show	Oct 6-8
Jersey City, N. J.	Annual Automobile Show	Nov. 1-6
New York	Automobile Salon	Nov. 14-21
Chicago	Automotive Equipment Show	Nov. 15-20
New York	National Passenger Car Show	Jan. 8-15, 1921
Chicago	National Passenger Car Show	Jan. 29-Feb. 4, 1921

TRACTOR SHOWS

Holdrege, Neb.	Third Annual Tractor Demonstration	Aug. 5-7
Los Angeles, Cal.	National Tractor and Implement Show of the West	Sept. 20-26
Columbus, O.	National Tractor Show	Feb. 6-12, 1921

FOREIGN SHOWS

London	Commercial Vehicles, Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November

RACES

Fulton, N. Y.	Dirt Track	July 31
Paris, France	Grand Prix Race, Sporting Commission	August
Erie, Pa.	Dirt Track	Aug. 7
Buffalo, N. Y.	Dirt Track	Aug. 14
Elgin, Ill.	Road Race	Aug. 21
Johnstown City, Pa.	Dirt Track	Aug. 21
Middletown, N. Y.	Dirt Track	Aug. 20-21
Flemington, N. J.	Dirt Track	Aug. 27-28
Canandiagua, N. Y.	Dirt Track	Aug. 28
Hornell, N. Y.	Dirt Track	Sept. 6
Uniontown, Pa.	Speedway Race	Sept. 6
Syracuse, N. Y.	Dirt Track	Sept. 17-18
Allentown, Pa.	Dirt Track	Sept. 25

TOURS

Milwaukee, Wis.	Annual Fall Automobile Show	Aug. 30-Sept. 4
Detroit	Good Roads Assn. Tour	July 14-20

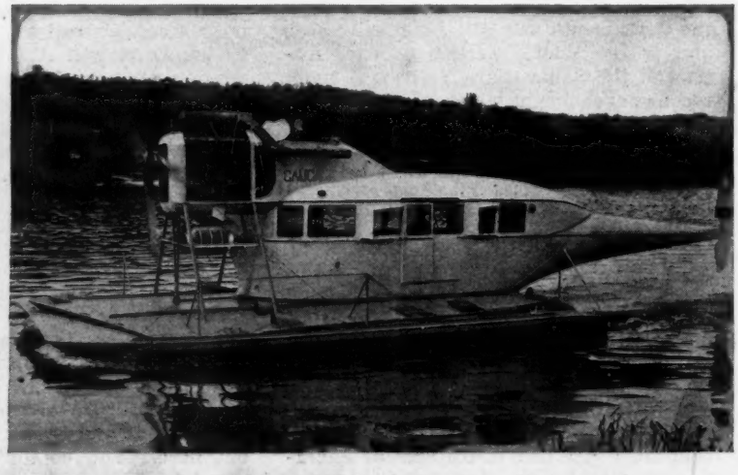
Horseshoer Turns Motor Mechanic—Another instance where the horse is being pushed into oblivion by the motor-driven vehicles, was brought out the other day, when one of the landmarks of East Cambridge, Mass., an old red building which had been standing for a century, is being demolished. For many years the place was used as a blacksmith shop and now it is giving way to a garage.

The blacksmith shop was erected in the early part of 1800 and had been used as such until several weeks ago. The tenant at that time, Arthur Hackett, who ran the shop for twenty-two years, decided that automobiles were the better and agreed to have the place torn down and a garage built in its place. Instead of horses in the future, he will be tampering with automobiles.

No Leniency for Intoxicated Drivers—That the Massachusetts authorities intends to show no leniency to operators under the influence of liquor was brought out here in court when Russell Mahler was sentenced to a year in the house of correction. It was also brought out that it will be difficult for him to obtain another license for some time as he automatically loses his license for one year from the moment he is sentenced. After that period, when he makes application for a new license, the Division of Highways is likely to refuse the granting of it. Mahler was tearing through the main street of the town at something like sixty miles an hour with ten companions filling the seats and hanging to the running boards. A crash came and all were more or less injured. It is alleged that he had his employer's car without permission.

Steal 508 Indianapolis Cars Since January—Records show that 132 automobiles were stolen in Indianapolis during the month of May, and 508 since the first of the year, or an average of eighty-four cars a month. Recoveries for May totaled eighty-three, while recoveries so far this year total 338, an average of fifty-six a month.

EUROPE DEVELOPS A GLIDING BOAT



Testing the new Besson gliding boat at Meulan. Driving power is obtained from an air propeller turned by a 300-horsepower Panhard engine. Hull is of the sea-sled type upon which is mounted a type of body similar to that of an aeroplane. Steering is accomplished by aeroplane type of rudder